

DUFFY KNOX LIBRARY
NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIF. 93940

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

SOVIET COMMAND AND CONTROL
IN AN HISTORICAL CONTEXT

by

Jeffrey Arthur Kern

March 1981

Thesis Advisor:

William Reese

Approved for public release, distribution unlimited.

T199006

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Soviet Command and Control in an Historical Context		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis March 1981
7. AUTHOR(S) Jeffrey Arthur Kern		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE March 1981
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 201
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release, distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Soviet command and control Command and control World War II Soviet organization Soviet history		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) An examination is made of the historical antecedents of present day command and control doctrine in the Soviet Union. The continuity of principal characteristics is demonstrated. The ideological determinants shaping the command and control system are first developed. These include centralism, collective decision-making, unity of command, and redundancy. Practical consequences of these are explored. The functioning of Soviet		

ABSTRACT (Continued)

mand and control during World War II is addressed in detail, with emphasis on the uniquely Soviet aspects. Current Soviet command and control concepts are addressed in a general way and linked to historical precedents and ideological precepts. Primary source materials are open Soviet doctrinal and historical publications, in translation.

Approved for public release, distribution unlimited.

Soviet Command and Control in an Historical Context

by

Jeffrey A. Kern
Captain, United States Army
B.S., Stanford University, 1970

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN SYSTEMS TECHNOLOGY - C3

from the

NAVAL POSTGRADUATE SCHOOL
March 1981

ABSTRACT

An examination is made of the historical antecedents of present day command and control doctrine in the Soviet Union. The continuity of principal characteristics is demonstrated. The ideological determinants shaping the command and control system are first developed. These include centralism, collective decision-making, unity of command, and redundancy. Practical consequences of these are explored. The functioning of Soviet command and control during World War II is addressed in detail, with emphasis on the uniquely Soviet aspects. Current Soviet command and control concepts are addressed in a general way and linked to historical precedents and ideological precepts. Primary source materials are open Soviet doctrinal and historical publications, in translation.

TABLE OF CONTENTS

I.	INTRODUCTION	8
	A. SCOPE	8
	B. SOURCES	11
	C. HISTORY	13
II.	IDEOLOGICAL FACTORS	16
	A. CENTRALISM	19
	1. Theater-Level Commands	21
	2. Nuclear Weapons Control	23
	3. Exceptions to Centralization	26
	B. INITIATIVE	27
	C. COLLECTIVE DECISION-MAKING	36
	D. UNITY OF COMMAND	41
	E. MULTIPLE LINES OF CONTROL	46
III.	COMMAND AND CONTROL IN WORLD WAR II	52
	A. COMMAND AND CONTROL CATASTROPHE: 1941	52
	1. The Commanders	54
	2. Police-State Command and Control	59
	3. Ideological Impedimentia	68
	4. Administrative vs. Operational Preparedness	75
	B. WARTIME COMMAND AND CONTROL	85
	1. Strategic Leadership	85
	2. The General Staff	89

3.	Organizational Flexibility -----	96
4.	Centralization -----	109
5.	Wartime Communications -----	121
C.	POSTWAR DEVELOPMENTS -----	133
IV.	SOVIET COMMAND CONTROL TODAY -----	138
A.	THE THEORETICAL MODEL -----	142
1.	The Control System Model -----	142
2.	The Military Hierarchical Model -----	145
3.	Measures of Effectiveness -----	148
B.	OPERATIONAL CHARACTERISTICS -----	150
1.	Operational Precision -----	153
2.	The Time Factor -----	155
3.	Algorithmic Control -----	163
4.	Stability of Control -----	171
5.	Commander's Representatives -----	178
V.	CONCLUSION -----	181
LIST OF REFERENCES -----		189
INITIAL DISTRIBUTION LIST -----		272

ACKNOWLEDGEMENTS

I gratefully acknowledge the patience and guidance of Prof. William Reese. Without his kind assistance this thesis would be twice as long and say half as much. I would also like to thank my Second Reader, Professor Paul Moose, for his helpful comments.

A special appreciation goes to my wife Laura, both for the encouragement she gave me when I needed it most and for aided family burdens she bore during the writing.

I. INTRODUCTION

This thesis develops the distinctive philosophy and dominant characteristics of the Soviet command and control system by examining the unique factors which have influenced its development. These factors are primarily ideological and historical.

It will be shown that Soviet command and control has developed in accordance with the ideology of Marxism-Leninism. The control system is rationalized to conform to the ideology, which legitimizes and validates it. The system has been tempered and shaped by the Soviet experience in World War II. Wartime experimentation resulted in practical forms of command and control which not only functioned effectively, but could also be reconciled with political dogma.

To understand contemporary Soviet concerns in command and control, a historical and ideological context is necessary.

A. SCOPE

A study of the means of command and control exercised by the Soviets must cover much wider-ranging considerations than a comparable study of Western systems. Because their political-economic system is itself a failure, the Soviet

Armed Forces (and security apparatus) are the primary means of political control over the non-Russian peoples of the Soviet Union and over those nations which have fallen within the sphere of Soviet influence. The military officers thus serve both internal and external political ends of the state leadership. While the U.S. has applied rigorous strictures to insure civilian control of the military, and have placed severe constraints upon the political role which military leadership may legally play, the Soviets have done the reverse. Military leaders have been forced to act as political executives and to promote political activity within the military. In turn the military wields exceptional influence in the internal affairs and economy of the USSR. As Holloway [Ref. 1: pp. 1] points out,

The Polish sociologist J.J. Wiatr has written that 'in place of the legal subordination of an Army by the civil power which is a distinct, isolated environment, we have to do [sic] with the conscious striving for organic union of the civil and military sphere of social life.' This organic union is based, moreover, not on the militarization of civilian life, but on the politicization of the Armed Forces.

The Soviet Armed Forces, integrated much more fully into the internal and external political schema of the country than our own, must serve simultaneously as the means to achieve both political and military ends. Indeed, to the Marxist-Leninist ideology there is no real distinction between the armed forces and the state in a socialist

system. As put by a basic Soviet military text [Ref. 2: pp. 180]:

The organization and development of the Soviet Armed Forces is directly bound up with the nature of the socialist state... The ideological and theoretical foundations of the development of the Soviet Armed Forces is Marxism-Leninism and its teaching on war and the army, and the communist ideology, which is the only ideology in the country.

It follows that the command and control system used by the Soviets is shaped as much by political, ideological, and sociological considerations as by purely military ones. To that end it is necessary to consider the sociological and political factors which influence the structure and functions of the Soviet command and control system. How totally different that system may be is implied by the following quotation from Oleg Penkovskiy, which might be apocryphal but would still be accurate [Ref. 3: pp. 252]:

One thing must be clearly understood. If someone were to hand to an American general, and English general, and a Soviet general the same set of objective facts and scientific data, with instructions that these facts and data must be accepted as unimpeachable, and an analysis made and conclusions drawn on the basis of them, it is possible that the American and the Englishman would reach similar conclusions -- I don't know. But the Soviet general would arrive at conclusions which would be radically different from the other two. This is because, first of all, he begins from a completely different set of premises and preconceived ideas, namely, the Marxian concepts of the structure of society and the course of history. Second, the logical process in his mind is totally unlike that of his Western counterparts, because he uses Marxist dialectics, whereas they will use some form of deductive reasoning. Third, a different set of moral laws governs and

restricts the behaviour of the Soviet. Fourth, the Soviet general's aims will be radically different from those of the American and the Englishmen.

B. SOURCES

The intent of this thesis is to rely most heavily on the use of openly published Soviet military publications. A voluminous amount of military doctrinal writing exists, including a variety of military journals, newspapers, and books. These materials typically avoid discussion of technological developments and orders of battle, but they do give a framework of ideologically-derived military doctrine and strategy, to which the Forces must adhere.

Soviet writings can not always be accepted at face value. The publication of differing points of view is carefully orchestrated to give the appearance of debate, while in reality the issues have been settled before publication starts. But once established, the doctrine is openly published as such. It can be accepted as genuinely reflecting Soviet intentions, and wide dissemination to their own forces is of course necessary. They can not afford to delude potential enemies at the cost of misleading themselves.

It is conceivable, but verging on the fanciful, to believe that all open Soviet military literature is published with an intent to deceive the West. Barnett wrote [Ref. 4: p. vii]:

But millions of officers and other personnel need to know the substance of such matters [Soviet military doctrine and strategy], if they are to function effectively, and the only feasible means of reaching them in most instances is through the open press. Nor is there any serious doubt as to the essential reliability of these publications. It would be inconceivable that the Moscow regime would risk deluding its own military personnel on such a vast scale, simply in order to confound the West. In any case, much of the material is independently verifiable -- for example, by observation of the weapon systems developed by the Soviet military, which necessarily bear a close relation to proclaimed doctrine and strategy.

Western observations or historical record will be used to validate and confirm the accuracy of Soviet doctrinal writings. It is this writer's contention that an effective study of doctrine, principles, and influential factors relating to Soviet C2 is a necessary prerequisite to the study of specific communications systems, control means, and command practices. The details of implementation will certainly change as new technology supersedes old. But ideology changes little, and doctrine does not change quickly. When changes do occur they are openly discussed, often over a period of years, in the literature. As William F. Scott notes [Ref. 5: p. 65]:

There is no excuse today for mere speculation... We have readily available a vast amount of Soviet military and political-military writings... There is a strange reluctance in the West to examine these Soviet writings in their totality. It is much easier to sit on the fence and speculate about what course the Soviets might take. A thorough analysis of Soviet publications on military matters, combined with known facts about Soviet weaponry, will present explanations of Soviet behaviour

that would be uncomfortable to study. Thus, in the market place, the myths still have a ready sale.

One note of caution must be mentioned regarding the use of Soviet sources. In analyzing Soviet writing, the reader must always be conscious of the author's target audience. Thus, journals intended for high military officers can logically be expected to reflect more accurately the statement of accepted doctrine than would similar writing for a soldier oriented magazine. In a similar way, Soviet writings which are published only in foreign language editions -- such as "Soviet Military Review" for example -- should be regarded with some degree of suspicion.

C. HISTORY

There are three main reasons why it is especially important to the Soviets, and thus also to the purpose of this thesis, to study and apply military history. The first is ideological, the second is theoretical, and the third is simply practical.

Marxism asserts that the historical process is the source of all true human knowledge. Marx and Engels wrote that "...we know only one single science, the science of history." It follows that to a Communist, history is the key to understanding all forms of social phenomena, including the art of war [Ref. 6: p. 37].

Soviet military theorists draw heavily on the events of World War II in developing modern strategy and tactics. Erickson has noted that the war is used as a vast data base, providing source material for operations research and statistical analysis [Ref. 7: p. 134]. As Zhilin asserts [Ref. 6: p. 17],

The main thing in it is not only the reliable facts, but also the generalizations, conclusions, and lessons... making it possible to improve military affairs, to foresee the ways of its further development...

Nor are the lessons of the last war blindly applied to current military affairs. As Pavlovskiy notes [Ref. 8] the events of the past have significance for today, only if interpreted in a creative way which assimilates the evolution of technology.

The Soviets believe that the next war will be a swiftly concluded one. Major staffs include a historical section specifically to analyze 'lessons learned' immediately after an operation has taken place. Today, as in World War II, critiques of the battle will be performed quickly and the conclusions, if new, will be disseminated to the entire front. [Refs. 9, 10]

As Erickson points out [Ref. 11], the strategic leadership of the USSR is composed of veterans of the World War. The lessons of the last war are still vivid in the corporate memory. The men who fought that war have

successfully managed the evolution of the Red Army into the Soviet Armed Forces of today. Constant reference to the war, and the role played in it by those who are still active, enhances the credibility of the leaders and inculcates national pride and patriotism.

Since history is used as a tool of policy, it is manipulated by successive regimes to suit specific purposes. The primary source of distortion is simple omission. As the years brought change within the leadership of the country, history tended to be re-written as well. This is helpful, as a historical event can be seen from several perspectives. As in radio direction finding, two readings can produce a fix.

II. IDEOLOGICAL FACTORS

Examination of Soviet command and control procedures must be made in the context of Marxist-Leninist ideology and Soviet political traditions. The Soviets have always integrated political control of military operations and organizations to a degree unprecedented in the West. This follows directly from the Soviet view, that the armed forces are an extension of the state and the people, and that the same processes which apply to society as a whole are also applicable to the army. Their doctrine explicitly states [Ref. 10: p. 45]: "The troop control system is therefore a social system by nature."

A body of Marxist-Leninist dogma has been created in support of the Soviet organizational relationships and military hierarchical command structure. While most Western states accept without question the organizational patterns common to all modern military organizations, the Soviets are discomfitted by its inherent contradictions to the Communist ideal. Of specific concern is the need to vest sole authority over formations of troops in battle in the hands of individuals rather than collective bodies. The ideology calls for soviets, but their own experience with such leadership means was not effective and quickly led in wartime to the return of the individual commander, albeit

not as he is known elsewhere. The implicit sense of class distinction between an officer and his men may be theoretically avoidable, but not practically so. It is perhaps inevitable that apologetics on 'one man command' appear so frequently in the Soviet military literature, often in juxtaposition with contradictory principles.

Colonel General Gornyy wrote [Ref. 12]:

The organs of Soviet military control are structured and function on principles of strict centralization and unity of command which have been confirmed in military legislation. This is caused by the specific nature of the Armed Forces and the necessity to insure unity of will and action by all personnel... at the same time, those requirements of the principle of democratic centralism which are confirmed in the constitution are also extended to the armed forces in full measure: the obligatory nature of decisions by higher organs for lower ones, the combination of unity of command with initiative and creative activity locally, and its combination with the responsibility of each state organ and official for the assigned matter.

Soviet literature devotes much attention to the requirements of ideologically sound theories, even in apolitical subjects. In the area of command and control, which has political ramifications if only because the army is the most powerful element of society, the Soviet political leaders have exhibited concern that, as the officers become more technical and quantitative in their training, they neither neglect nor denigrate the role of ideology. Engineers and scientists have shown less patience with ideological considerations than the party finds

acceptable, and as rigid enforcement of the ideology is the glue that holds Soviet society together, this represents a threat.

Part of the answer to this threat was to develop a scientific approach to leadership which would be couched in terms of the dialectic, forcing the engineer-commander to deal with technical subjects in a party-directed manner. The Main Political Administration saw that the advancement of cybernetics and sociology were inevitably to supersede the traditional 'party-political' approach to leadership. It made a determined effort to expand the scope of dialectical materialism as a general methodology in military affairs and thereby to legitimize cybernetics with Marxist-Leninist interpretation. As will be seen, the MPA had reason to embrace the new technology with more enthusiasm as its potential for control became clearer. The traditional Soviet belief in a 'correct' solution to an operational problem, the belief that there is an optimal way to make every decision, lends impetus to the implementation of automated means of command and control.

For a number of reasons, not least of which is its own perpetuation, the CPSU is pervasive in its control over the military at all levels and in horizontal as well as vertical ways. It is evident that the revolutionary and conspiratorial birth of the 'Bolshevik' revolution still has meaning for the Party today, as it evidences an acute

sensitivity to matters of secrecy and the potential threat posed by the armed forces. Thus the redundant lines of control which extend to the very lowest levels of the military, and the independent means available to monitor the forces in peacetime and in war. All of these factors, which are more or less peculiar to the Soviet military system, will be examined in terms of their effects and consequences on the command and control system.

A. CENTRALISM

One of the basic tenets of Soviet ideology is 'democratic centralism.' This is the Leninist principle legitimizing absolute dictatorial power for the supreme control organization or executive. Theoretically, the will of all the people is expressed in the decisions and directives of the supreme commander. The relationships between CPSU and government entities at the highest levels of Soviet society are deliberately ambiguous, especially since there is a great deal of overlapping membership among the ruling oligarchy. Soviet and Western views of these relationships are presented by Gornyy [Ref. 12] and the Scotts [Ref. 13].

Unlike the carefully prescribed separation observed in other social systems, the Soviets take a holistic view. Zemskov noted [Ref. 14]:

The experience in military-strategic direction of a war, accumulated by our party during the armed defense of our socialist homeland, enables us to separate out and to emphasize the main principles operating in this particular area. First of all there is the principle of unity of political and military leadership. It embodies the requirements of one of the principal laws of a war -- its complete dependence upon politics.

The exact nature of the supreme command element is not specified anywhere in Soviet writings, but there is a strong inference that it will resemble the State Defense Committee established during the Second World War. Whether the ultimate authority will be a single individual or a small group, it will wield absolute power and authority within the USSR. No activity of any state organization or party apparatus is legitimate unless sanctioned by the legitimate delegation of authority and responsibility from this prime source. An indoctrination study guide by Fedchenko [Ref. 15] describes the deductive legitimacy of the military hierarchy:

Our Armed Forces are organized according to the principle of centralism. This means that all troops are strictly subordinated to central military entities and to a single supreme command. All lower entities execute orders and instructions of superior military entities precisely and on time, and they are accountable to them for troop combat and political training. Strict monitoring of execution from top to bottom is an inalienable feature of centralism.

The extreme centralization of the Soviet system is symptomatic not only of their ideology, but also of the fear of losing control and the lack of trust within the system.

The statement attributed to Stalin "Trust is good, but control is better," is operative today. Soviet leaders fear any loss of positive control of the forces, to even a minor degree. The blind obedience expected of the Soviet soldier is a consequence of the most rigid discipline. Independent action by subordinates is forbidden, as discussed below. If it were possible, even the most trivial tactical decisions would be made in Moscow. The whole thrust of Soviet command and control, at strategic, operational, and tactical levels, is to eliminate the freedom of choice of the commanders. Brown has characterized the Soviet leadership as being "thoroughly fearful of spontaneity," [Ref. 16: p. 122], both because it could represent a threat to them and because spontaneity will inevitably perturb the rigid plan promulgated from the top.

1. Theater-Level Commands

One of the apparent consequences of centralization has been the traditional Soviet reluctance to allow intermediate headquarters to exist between the fronts and the high command. The number of subordinate elements supervised by any high headquarters tends to be much higher than in corresponding Western organizations. Sokolovskiy [Ref. 17: pp. 489-490] discusses the relationship between the Stavka and the fronts in World War II and concludes that the use of intermediate theater level headquarters was a hindrance. Thus, during the Byelorussian campaigns the

Stavka was controlling over a dozen fronts, with only roving representatives as intervening echelons.

More recently, however, there has been some indication that intermediate echelons are being established. Woff reported [Ref. 18: pp. 79-82] that the Soviets established a Far East Theater of Operations in December 1978. This theater is believed to include the Far Eastern, Transbaikal, and Siberian Military Districts, encompassing some thirty divisions in all. Woff's analysis is especially convincing in view of the article by Vydrov [Ref. 19: p. 24] which appeared in April the following year, and is as definite a statement of policy as might be expected from the Soviets:

The experience of World Wars showed that it became practically impossible for a supreme high command to exercise direction of military operations of major groupings of armed forces without an intermediate echelon and that both an overall system of strategic leadership and its echelons must be set up ahead of time, before the beginning of a war, and their structure must correspond strictly to the character and scope of the upcoming military operations.

Woff also noted that the Warsaw Pact exercises which took place in 1979 reflected that the five western most military districts are being organized as two additional groups of forces to supplement the four Soviet groups already in place in Eastern Europe. The Leningrad, Baltic, and Belorussian Districts compose one group (Northwestern?) while the Carpathian and Kiev Districts compose the other

(Southwestern?). It is possible that the new Warsaw Pact headquarters at Lvov is being established to control not only the Soviet Groups and the various national forces but also the five military districts. There is historical precedent for the theaters and for the groups of forces as well.

2. Nuclear Weapons Control

The absolute control of the forces by the strategic leadership of the country is still a characteristic of the Soviets. The need for such control is seen as being more imperative when nuclear weapons are employed. As Zav'yalov sees it [Ref. 20], the advent of nuclear weapons allows the strategic leadership to 'steer the ship' from the Kremlin:

The limits of the tactical, operational, and strategic zones of combat actions have become considerably wider, the depth of the modern combined-arms battle and operation is greater, the scale of war is broader, the process of destroying any of the enemy's targets is ten times quicker, and the dynamism of combat action is greater, all of which predetermine abrupt and marked changes in the combat situation... Nuclear weapons make possible the simultaneous accomplishment of tactical, operational, and strategic tasks. There has been a significant increase in the opportunities for the strategic leadership to influence the tactical actions of the troops. Furthermore, the employment of strategic nuclear weapons can have a direct, decisive effect on the nature of the tactical actions of the troops.

The events which took place during the massive Okean 70 and 75 naval exercises, which included coordinated attacks occurring simultaneously on opposite sides of the world, demonstrated ability to direct tactical operations

from Moscow. Despite the intermediate echelons of command in place and operating in the theaters, the central authority was able to control events at the lowest levels. [Ref. 21: p. 39].

One example of the practical effect of the policy of centralization on the organization of the forces is evident in the way that nuclear weapons delivery units are structured within the force. In the United States Army, nuclear capabilities were integrated down to the lowest level possible within the existing force structure. Any heavy tube artillery unit is theoretically a nuclear threat to the Soviets. This presents them with an identification problem, to the extent that they need to detect the subtle signs of a nuclear-capable unit in order to differentiate between it and the conventionally equipped one. The Soviets did not integrate nuclear weapons into existing force structures, but created entirely new ones which are kept distinct. These units have their own integral control and communications equipment which make them completely independent of the rest of the force. They are self-sufficient units under the personal control of the commander. Since Soviet doctrine recognizes nuclear fires as maneuver elements in their own right, which may operate without supporting ground troops in some cases, the nuclear fire elements now represent the commanders own swift and devastating means to personally destroy the enemy.

formations. In contrast to conventional artillery, which serves as a support element to maneuver elements, nuclear artillery is now supported by the maneuver forces.

There is reason to believe that the Soviets kept their nuclear units separate in order to avoid certain control problems. All nuclear delivery means are farther to the rear in the Soviet plan than ours. It is expected that the Soviets will rely extensively on the Strategic Rocket Forces and Long Range Aviation to deliver the bulk of the pre-emptive attack in the theater. This will allow the field commanders to preserve their nuclear capability for use after the initial nuclear detonations have severed the lines of communication with Moscow. Field commanders may not be able to call for strategic forces and hence will have to rely on their own inherent reconnaissance, target acquisition, and delivery resources for targets of opportunity.

Should the Soviets elect to deploy an army without any nuclear capability, they can easily strip away the nuclear delivery units from the force and concentrate that capability in another theater -- without disrupting any other of the elements of the parent unit. The unique command and control facilities of these units would move with them.

3. Exceptions to Centralization

The Soviets' strict adherence to the most centralized control systems has in recent years been reversed in at least one and possibly other areas. Andersen, Drozhzhin, and Lozik [Ref. 22: p. 20] note that there are certain occasions when decentralized control is necessary, due to the limitations and vulnerabilities of transmission means and the time delays experienced in relying completely upon centralized control. They characterized the two systems as follows:

The level of detail in the decision also depends upon the command and control method adopted: with centralized control, the decision is more detailed, with decentralized control, the lower level commanders make the decisions on their own and report to higher headquarters based on preliminary, general instructions; with mixed command and control, both methods are combined.

The specific operations they described were air defense operations, which based upon their interpretation of events in the Middle East and Vietnam wars, may necessarily function in the decentralized mode. The reasons for this willingness to decentralize may lie in the high degree of automation and rather advanced algorithms which have been developed for air defense. It can be supposed that as more of the force elements acquire validated automatic command and control systems, decentralization may be more common in the army as a whole.

The extremely brief critical time within which the air defense forces must respond demands decentralization. Even during World War II, PVO forces operated autonomously. They shared a district alert and warning network but engaged aircraft on their own initiative as prescribed by standing operating procedures.

B. INITIATIVE

One of the inevitable consequences of the highly centralized nature of the Soviet system is the premium it puts upon conformity to the letter of the laws, orders, and directives disseminated downward through the system. Spontaneous action is not likely to be approved by a superior unless it is absolutely successful, and perhaps not even then. One of the concerns evidenced most frequently in the Soviet military literature is the need for greater initiative on the part of the commanders and the soldiers during exercises and in combat. While recognizing that to take advantage of favorable opportunities which can not be planned for in battle it will be necessary to rely upon the ability and motivation of subordinate commanders, there is a reluctance to loose the restraints completely.

The need for initiative was the subject of an entire book [Ref. 23] but the meaning of the word, and the Soviet intent, must be clarified. "By initiative in battle we mean striving by our servicemen to find the best means for

executing their assigned mission and for implementing the plan of the superior commander..." and again, "...using his intelligence and initiative, he will execute the order precisely and on time..." Sukhcrukov makes the meaning even clearer [Ref. 24]: "For initiative is not necessary for initiative's sake, but to fulfill assigned tasks in the best way."

The Soviets also use the term 'operational independence' in a way which can mislead Western readers, to whom it might imply a great degree of discretion and authority vested in a commander in a remote or restricted theater of operations. According to Gordiyenko and Khoroshcho [Ref. 23]:

By the operational independence of commanders, and of the subunits and individual servicemen under them, we mean their ability to successfully execute their assigned combat missions under difficult combat conditions, without the assistance of superior commanders or neighboring troops, by effectively using the weapons, combat equipment, and maneuvering capability of the subunits.

The more senior and politically aware a Soviet decision maker is, the more sensitive he is to the uncertain consequences which can arise from seemingly innocuous decisions. There is also a greater personal stake riding on the decision, and greater opportunities for failure, since every decision will be judged not only in military terms but also in ideological ones. The danger of making an error in judgement is much greater in the Soviet system both because

the decision will be judged by more criteria and because of the severity of punishment for failure. Sins of omission are by nature less severe than sins of commission; hence there is a tendency to equivocate at all levels. The higher the level, the more likely the decision maker will be to hesitate. This tendency is further motivated by the many sources of criticism which the Soviet commander may face in official ways. Mistakes are openly discussed and attributed to individuals by name after the conclusion of every exercise. The political officer, often placed in an ambiguous position relative to the commander, adds an additional measure of uncertainty in a particularly danger prone area. There also are the military councils, which meet specifically to critique individual and unit performance. How great the temptation to put away common sense and follow blindly the directives of one's superiors, where culpability for faulty execution can be evaded by the "following of orders."

Current Soviet literature carries frequent articles addressing the need for developing initiative in NCOs and junior officers. Perhaps because of the rigidity of the command system and the severe consequences of failure to obey orders, lower level leaders are apparently reluctant to deviate from the specific instructions of their superiors even when common sense would indicate such deviation. The use of the word "initiative" applies only to the means at

hand for implementing the commands of the superior officer -- never does it imply a new undertaking of the subordinate's own devising, nor a change or deviation no matter how slight in the substance of the superior's plan. Weiner and Lewis shed some light on the limits of personal initiative [Ref. 25: p. 115]:

The logical result of this rigid attitude is a strict adherence to the old Soviet command tactics. Since the end of World War II, there has been a slight relaxation of this rigidity among middle- and high- levels in the Soviet Army. The lower leaders, however, are not given this degree of latitude; for them 'initiative' means carrying out the orders as expeditiously as possible... one of the most notable attributes of the Soviet soldier is his unquestioning obedience to his superior... the lower level leaders must not only grasp the schematic and mechanical concepts but insure that the unit commanders apply this theory with complete understanding in practical applications.

An appreciation of the Soviet use of 'initiative' can be gained by examining an article recently appearing in Red Star [Ref. 26: p. 41]. It describes an incident which occurred while a lieutenant was leading a road march along a route prescribed by his commander. Although his commander had specifically told him to act as the circumstances might require should the road become impassable due to heavy rains, the lieutenant had refused to allow his drivers to bypass a boggy area in the road, and had gotten his convoy stuck. At the same time, vehicles from other units were travelling to the side of the road and avoiding the low area.

On beginning the descent into the low area, Maksimov could not help but see that fresh automobile tracks went off from it to the left. That meant there was a detour here. And the driver believed that he should turn to the left, but the lieutenant did not dare take that step: "It's not our job to complicate matters. We'll take the road given us."

In discussing the incident further, the author condemns the lieutenant for not displaying initiative.

In my opinion, this incident is a rather convincing illustration that the practical value of execution which is not reinforced by independence or initiative is degraded substantially.

Although it seems a trivial case, the significance of the article lies in the fact that it was written at all. Even the rawest of recruits in the West, we would like to believe, would see the common sense of bypassing a mired road.

The young lieutenant's failure to do the obvious can be attributed to a number of factors. First, he was given an order which, although it left room for his own judgement, he felt safer in following blindly. Second, to deviate from the original route would be an act of independence which he might feel should not be taken without conferring with others. He feels insecure without the collegial accountability and collective decision making which, he has been brought up to believe, is the socialist way. Third, his departure from the exact route which his commander had

expected him to take would violate the paramount rule of 'operational precision', a principle discussed below.

That articles such as the one described appear frequently in the Soviet military literature is indicative that the problem does exist. Yet it seems that the need for some elementary, common sense independent action is a sensitive issue, for the very article described above goes on to temper the need for initiative with the necessity of clearing actions with one's superiors. An incident is described where a junior lieutenant suggests a new training methodology to his commander, but is told to "Work a bit more" on it before discussing it again [Ref. 26: p. 44]:

The lieutenant was offended and decided to test the new methodology on his own. He wrote one thing in his lesson plans, but conducted the classes in his own way. It stands to reason that not everything went well for him... It would appear to be clear that to trust someone is one thing, but to leave subordinates on their own is quite a different matter.

The entire issue of independent action and initiative is one of tremendous importance to the Soviets, as they try and balance the needs of the party and state for tight control against the military necessity of freedom to 'maneuver'.

There is perhaps a reason why the literature stresses the importance of cultivating 'initiative' at the lower levels. The middle and upper level decision makers, while given somewhat more latitude and wielding greater authority and responsibility, are also much more visible to the

central control organs of the Army. The more circumscribed actions open to the small unit commanders -- of squads, platoons, companies, and even battalions -- do not readily lend themselves to control from the highest levels. Also, initiative actions on the part of a platoon leader are unlikely to be of interest to or to effect in any substantive way the plans of the central authorities.

Initiative at higher levels of command is not being noticeably encouraged in the literature -- whether because higher commanders already feel comfortable with it or because they are discouraged from substantive personal initiatives is hard to say. There is a sensitivity to the necessity of exercising greater control over the individual command personality within the Soviet Army. As an officer rises through the ranks it is not obviously desireable that he 'make it' on his own initiative, although a certain measure of that character trait can be useful in some cases, but rather he should rise through the selection efforts of his military and political superiors -- he must be 'vetted' in every way. Given the rigidity and doctrine bound nature of the Soviet Army, it is hazardous to make mistakes. As the old expression goes, 'The only people who don't make mistakes are the people who don't do anything,' which leads to inevitable consequences when mistake-free records are used as a promotion requisite. Gifted leaders with charismatic personalities who are capable of independent

action may be useful in many armies, but these are not always safe traits to have in the Soviet Army. The inspired leadership of a regimental or divisional commander "on the rise" can be considered a threat -- a military coup can easily develop from personal loyalties. Soviet leaders have always been sensitive to the power of the military and the potential threat that it poses to their own authority.

The powers that he are left in somewhat of a dilemma. As Brown described in the political milieu, but equally applicable in the military [Ref. 16: p. 31]:

The great problem facing all of the regimes with regard to the growing technical and economic intelligentsia, however, is how to invest them with responsibility without, at the same time, giving them real power. It presumably can be done as long as the political leadership remains united and self confident.

An interesting case which sheds some light on the independence issue because of its uniqueness -- an instance where a great degree of authority and autonomy was granted to a field commander -- is described by Robinson [Ref. 27: p. 29]:

An Austrian correspondent's account of a trip through Soviet Central Asia during 1967 conveys some interesting information... in September 1966, Moscow was said to have delegated responsibility and authority for handling border incidents to the local commanders. That arrangement was said to hold two advantages for Moscow: it could repudiate the local commander if he failed to maintain order, and it enabled him to move promptly and independently when necessary.

We know from one source that the Soviet border commanders had what would seem to be a great deal of latitude, delegated to them on the theory that in an emergency they would not have the time to cable Moscow for instructions and the possibility that they could exceed their authority would be balanced by their having to answer to the center for all actions. This is not an unreasonable administrative device for policing a very long border at a great distance from the high level decision makers. [Ref. 27: p. 42]

Several observations must be made. First, the threat at the time was a purely conventional one. There was also substantial evidence that the clashes were being provoked by local 'Red Guard' elements of the Chinese cultural revolution, possibly on their own initiative. Second, the spontaneously developing nature of the clashes, and the rather restricted scope of the perceived intentions [i.e., the riverine islands, which the USSR had allowed the Chinese to use, anyway] implied low risk to the leadership. Third, the communications links between the border patrols which were being 'ambushed' and the Kremlin were likely to be tenuous and not time-responsive. Four, the Soviets could have perceived that a physical conflict, or the threat of one, on her eastern borders could be useful in pressuring the Warsaw Pact nations into widening the scope of commitment attendant under the treaty, to include conflict outside of the Eastern European area. It should be noted that the Commander of the Far East Military District, Pavlovskiy, was appointed in 1969 to

the newly recreated position of Commander, Soviet Ground Forces. Clearly the Kremlin had every reason to suppose that the commander on the scene was capable and trustworthy.

The border incident is significant in its uniqueness. The customary rigid centralization was relaxed, and trust and confidence was extended to the local commander. This represented a radical departure from the strictly responsive role accorded to even the highest ranking military commanders. They too are bound by the requirement of blind obedience. As Sokolovskiy wrote [Ref. 17: p. 498]:

Generals and officers of the Armed Forces are not mechanical executors of the plans and wills of their seniors. While understanding that an order is law, they execute it with a deep awareness of its purpose.

If subordinates are not yet automatons, the Soviet leadership would like them to act as if they were.

C. COLLECTIVE DECISION-MAKING

The Soviets have traditionally combined group or collective discussion with the authority and responsibility of an individual in the decision-making process. The importance of such collegial activity is apparent in the attention given to the subject in Soviet literature. As with centralism, there is an ideological

requirement to involve the peoples' will in the commander's decision. Within the Armed Forces, this collective activity is expressed in the form of the commander's dependence upon his staff, the authority of the Military Council in operational matters, the guidance of the party organizations within the military organization, and the People's Control Groups. As Marshal Sokolovskiy wrote [Ref 17: p. 499]:

As [World War II] demonstrated, the operational and strategic missions were not planned and carried out by individuals, but were the result of collective creativity. Centralized command does not exclude, but rather presupposes, the use of collective creativity.

It is extremely difficult to tell how much use is made of the collective effort, or how often it may be overruled by the commander. Using the Stavka of World War II as a positive example of the beneficial nature of this effort, Sokolovskiy indicates [Ref 17: p. 489] that all important decisions were made only after consultation with the front commands, the commanders in chief of the branches of the Armed Forces, the service commanders, and other 'individuals concerned.'

The destructive power of nuclear weapons and the highly dynamic nature of modern warfare are such that no one individual can cope with the information flow and the speed of decision required. As Skirdo noted [Ref. 28]:

Working out and adopting a feasible decision (regarding the preparation for and implementation of strategic operations) is today such a responsible and complex matter that it is beyond the capabilities of a single military commander, even the most outstanding one... it is generally acknowledged that military direction and leadership can be effected only by a collective identity. Collective direction of military efforts during a nuclear missile war has become an objective necessity... Accomplishment of all missions is possible only with the existence of a collective body to direct and manage the war.

There are two operationally important collegial bodies, one being the staff, which prepares the information it has gathered into specific alternative courses of action for the commander's decision, and the other being the Military Council (Soviet). According to Kczlov and Slavin [Ref. 29: p. 28], the military councils of districts, fleets, and armies are the "leading bodies of military command." Downgraded to consultative bodies in 1947, their status was again changed in 1950, returning them to

...full powered collective bodies. They bear complete responsibility to the CPSU Central Committee, the government, and the minister of Defense for the state and combat readiness of the troops... The collective form of leadership in the form of military councils is widely used on the superior level of the socialist armies and is skillfully combined with one-man leadership.

The other collective entities found in the Soviet forces probably play a non-operational role only, serving mainly as monitoring and policy enforcement agents. The

Communist Party and Komsomol organizations are charged with broad responsibilities for overseeing the entire unit, with the expected emphasis on training, indoctrination, ideological hardening, and discipline. The 24th and 25th Party Congresses resulted in increased pressure through the party channels on insuring that party policy was carried out at all levels. Consequently, much of the work of the party organizations at the unit level and below is now directed toward monitoring performance and verification of execution of policy. [Ref. 30]. Belyayev [Ref. 31] stressed the cyclic nature of the control process in military collectives, and the importance of insuring continuous feedback.

Monitoring may not be reduced to the final operation of a managerial cycle alone. It permeates all stages of the cycle: the development and making of the decision and the organization of its implementation.

Malinovskiy [Ref. 32] indicates that the commander should rely upon the party apparatus and direct its activity to strengthening military discipline and to successful performance of combat missions, if he himself is a member of the CPSU. If he is not a member, then he must rely on the party organization to accomplish those missions -- but he can not direct them. Malinovskiy also notes the key role played by the party in transfer of information up and down the chain of command:

Communists of headquarters and directorates are expected to work persistently to instill and maintain sophistication in work and to insure precise troop control and operational movement of accurate, exact information both from the top down and concerning affairs in local areas. They must help the commanders work out correct plans and carry them out fully at the proper time.

The role of the party organizations is described by Ivanov [Ref. 10: p. 62] as extending into operational matters. The party- political apparatus must work closely with the commander and staff in preparation for and conduct of the battle, and not only the deputy commanders of the political units but also the secretaries of the party organizations must be present when the commander gives combat orders and when the interaction of the troops is specified. Ivanov [Ref. 10: p. 202] observes that:

...during collective work there is an adjustment in the commander's psychological state: his receptiveness, self criticism, and reaction to the conditions of the situation are improved, the danger of subjectivity and voluntarism is decreased.

Thus, it seems that collective activity may allow subordinates to question the more arbitrary decisions of a commander.

After the collective body has made a decision, the commander assumes the responsibility for implementing it. The requirement for collective action increases with the level of command. At the smallest unit level, collectivization does not apply to operational decisions

at all. Any decisions will have been made higher up the chain, and the lower level commander is responsible only for exact implementation.

D. UNITY OF COMMAND

The dominant role played by the Communist Party in developing and controlling the activities of the Soviet Armed Forces has historically caused ideological and practical problems which have degraded the efficiency of the military. While the necessity of vesting absolute military authority in a single individual at any given echelon is accepted without question in the West, indeed throughout recorded history, the Soviets have never been comfortable with that due to their ideology and the historical development of their forces.

The first difficulty, the ideological one, arises from the implicit class privilege separating the officer from his men, and the basically undemocratic authority vested in the commander. His power is not subject to the will of the 'military collective' in any positive way, although, as Timofeychev noted [Ref. 33: p. 221], the commander is open to criticism from party members within his command: "...at party meetings the communists have the right to criticize any party member or candidate, irrespective of his position. It is only criticism of the orders and

instructions of the commanders and chiefs that is prohibited."

The frequent articles and pamphlets published by the Soviets specifically addressing the ideological legitimacy of one-man command attest to the importance it has in their minds. It is referred to as "the most important organizational principle of the Soviet Armed Forces..." [Ref. 12] and "the most expedient form of troop control." [Ref. 33: p. 16] The Soviet espousal of one-man command is basically for the same cogent operational reasons that every other army uses it.

However, one's understanding of the advisability of applying the principle of one-man command was not enough. It was also necessary to show that under our conditions one-man command based on its political and class nature does not contradict socialist democracy and that it is fundamentally different from command principles in an imperialist army. [Ref. 34: p. 52]

Timofeyechev asserted [Ref. 34] that there were three reasons why the one-man command did not contradict 'Soviet democracy.' First, the commanders are designated by Soviets of the people, hence must reflect their collective will; second, the Soviet obviously must select the most qualified officers to command; and third, the commander is always under the direct control of and responsible to the party organs and Soviet authorities. It is for these reasons that "...an order of the commander is a law for subordinates. The order must be carried out

unquestioningly, accurately, and on time. [Ref. 34: p. 51]

Lomov [Ref. 35: p. 169] carefully delineates the complementary roles these principles play. Under the complex conditions of modern war, "...it is beyond the capability of a single person to control troops in combat, let alone major operations on a strategic scale." Thus, the commander must rely on 'collectivism in control' while the responsibility for the final decision and the right of sole leadership are the commander's.

The continued emphasis on one-man command may also be intended to allow a more definitive, objective grounds for evaluating a commander's performance. Under the redundant and multiple lines of control which exist within the Soviet system, it is sometimes impossible to affix blame for poor unit performance. With so many organs and individuals having control in direct and indirect ways over the commander and his decision, poor performance is often unattributed, or can successfully be shifted back and forth among the commander, the staff above him, the staff below him, the political deputy, and so forth, until corrective action is given up in frustration or boredom with the process. By fixing the responsibility firmly on the commander, his stake in the decision making process is increased and presumably his motivation to exert his authority is enhanced as well.

The second difficulty with unity of command arises periodically when for some reason, the training and preparation of the military leaders is not sufficiently infused with ideological conviction. Periods in the Soviet history when political commissars were instituted had in common that the available military commanders qualified to lead in battle were not ideologically trained to a degree felt necessary by the party apparatus, or were considered a potential threat by the state leadership.

In the post-revolutionary period it was necessary to use ex-czarist officers, as they were the only militarily experienced individuals available to the new soviet state. While professionally competent, they were highly suspect politically since they had owed allegiance to the Czar and had in many cases been instruments of his repression of the proletariat. In order to control these officers their command authority was shared with political commissars who acted as ideological overseers within the army.

In a certain sense, the scientific-technological revolution has created a similar situation, in that the new military leaders are more technically qualified and less prone to accept ideology than previous generations of Soviet Army officers. They are tending to be 'no nonsense' engineers and scientists and are a source of growing concern for the political leadership. In a speech before the Scientific-Practical Conference of the Armed

Forces Executive Political Workers, 6 - 7 June 1976, the Chief Of Staff of the Soviet Army called for an enhanced role for political officers in increasing party control and verifying orders and policy [Ref. 36: pp. 138-139]:

Everyone knows... that party work has its own particular features. Party organizations can not mechanically copy the work techniques of commanders and chiefs of staff and duplicate their decisions and orders. The most important duty facing party organizations is to be persistent, using active means of persuasion, to insure complete and high quality fulfillment of combat and political training tasks. Using the methods available to them, they must increase the role of the commander's and chief's orders and exert an active influence on the work of the military collectives of units, ships, and military training establishments.

The urgency of re-asserting party and ideological control was given impetus by the mutiny of the Storazhevoy Krivak Class cruiser in 1976.

When talking about intraparty democracy we should keep in mind its close association with one- man command as the principle governing the development and control of the Armed Forces. Therefore, the political organs must become more active in instilling a spirit of party- mindedness into the work of the military control organs, be constantly concerned with the development of one- man command, raise the authority of commanders, and be implacable toward all shortcomings in this field. [Ref. 36: p. 138]

The parallel mentioned above between the present era and the early twenties is apparently viewed by Ustinov as deriving from the introduction of technically highly qualified but politically naive officers into positions of

higher authority. These officers have spent their time in study of scientific and engineering principles and have more faith in mathematics than the party.

A great deal of work has been done in the Soviet Armed Forces in recent years to improve the selection, placement and training of cadres. A policy of promoting promising young officers to principal commands, political, engineering, and technical posts is being actively pursued. These officers have high theoretical training but do not always possess the necessary practical experience. Party concerns for shaping and training them is one of the most important tasks of military councils, commanders, staffs, and political organs. Our Party makes particularly high demands on political workers in the Armed Forces. [op cit]

The message throughout the entire speech is that the growing technical sophistication of the Soviet soldiers and officers is increasingly leading to conflict and contention -- lack of proper attitude must be corrected by strengthening party control at all levels to insure ideological purity and obedience. Noteworthy is the call to use 'active means of persuasion' to insure compliance with orders. The role of the political officers is being strengthened and the degree of party control over the military increased. This phenomenon has also been described by Holloway [Ref. 1].

E. MULTIPLE LINES OF CONTROL

One of the most striking characteristics of the Soviet command and control system is the multiplicity of control

and monitoring channels. As in the civil sector, Soviet military control is exercised by means of four or more distinct channels of varying degree of independence [Ref. 37: p. 122].

The first channel is the military chain of command, similar to that which exists in all armies. In the Soviet case this runs from the General Staff through the military districts or groups of forces (which would become fronts in war time) to the various armies, divisions, regiments, etc. Command in this hierarchy is typified as 'one man command' (yedinonachaliye) and is much discussed in Soviet literature.

The second channel of control is via the Political Administration channel from the Military Affairs Committee of the CPSU, to the Main Political Administration, to the political directorates of successive echelons. This channel is represented at the unit by the Deputy Commander for Political Affairs.

The third channel is closely allied with the second and consists of the Communist party organizations within the armed forces. These organizations are closely tied to the local civil party apparatus of the region or city and maintain interlocking relationships.

The fourth channel is that of the KGB officers assigned to each level and reporting through their own exclusive channels to the State Security Committee.

Informers and undercover agents within the armed forces can be considered a part of this group.

The obvious advantage of multiple control lines is that there is an inherent redundancy in the system, thus contributing substantially to the durability of the control apparatus. The disadvantage is that the control lines may not always support one another -- indeed they may be diametrically opposed.

In the normal course of operations, the party and the security channels seem designed to function primarily in feedback roles, passively reporting through their own channels on those matters of special interest to their superiors. It is difficult to predict how passive the executives of these channels will be in wartime, however. Experience in the last war demonstrated the dynamic relationship between these channels, and the way in which the balance of actual command power shifted among them.

The most visible interaction of the Political Administration of the Army in the last war was the presence of commissars and political instructors within the force. They had the authority to sign all operational orders; in fact, an order was not valid if the commissar did not co-sign with the commander. It is true that this arrangement was terminated in 1943, but has persisted sporadically in the post war years as the political environment of the USSR changed.

The interaction of local party entities similarly cannot be dismissed, as evidenced in the power of the front military councils during the last war. Local party leaders, some with national standing, served as members of the councils. Three premiers had such service -- Bulganin, Khrushchev, and Brezhnev.

The security police channel, while patently a monitoring one, led to conflicts in the war. Intelligence which was not validated by that channel was dismissed, and intelligence received by that channel alone was accepted without corroboration. As Logan has said, "A man with one watch knows what time it is. A man with two watches is never sure."

The presence of multiple channels for monitoring the activities of the commander, and potentially directing those activities, must contribute substantially to the anxiety attendant on decision-making in the Soviet Armed Forces.

The means to independently verify the situation within subordinate units is deemed important enough to justify expenditure of considerable resources. Odor has contributed a Soviet perspective on the utility of the party apparatus [Ref. 38: pp. 19-20]:

The party's control apparatus within the military provides an alternative information channel to the top, and it thus serves to raise the uncertainty level of subordinates and to make collusion among them

risky. It follows quite logically that the system of party control may well enhance rather than reduce Soviet military power... it is edinonechalye (unity of command) that allows military subordinates to feed the high command selective information that distorts the top's perception and thwarts rational corrective action.

The more sinister side of the control apparatus is revealed by General Grigorenko in an interview conducted after his defection. [Ref. 39: p. 5]. He described the security agent assigned to each battalion, who does not appear on the battalion roster because he is assigned to the battalion commander by his 'superiors'. The agent usually is uniformed as a lieutenant, although he is actually a member of the KGB. He "is the most feared person in the battalion because he is the most powerful. His relations [reports], which are secret, can bring the worst punishment for soldiers and officers." This agent works for the division counterintelligence section, which "...can at any moment carry out an incursion, facing the command with an accomplished fact. Actions of this kind, carried out with total impunity, often have caused death or deportation for many youths who opposed the regime." Grigorenko also describes the network of secret informants present everywhere within the armed forces. "The fate of every Soviet soldier is to ask himself constantly if his words will be reported to the Special Section by his best

friend, to fear a report by a malevolent subordinate, to no longer trust anyone."

The Soviet command and control system is notable for its reliance upon multiple independent channels for feeding back information to the upper levels. This indicates an unwillingness to trust subordinates, if not an outright suspicion of them.

III. COMMAND AND CONTROL IN WORLD WAR II

The Soviet Union had no effective command and control system prepared to cope with contemporary warfare in 1941. When the German forces attacked on 22 June, the Soviet armed forces and strategic leadership had little more than a peacetime administrative structure, which was wholly inadequate for operational purposes. The people, hardware, and procedures nominally composing the command and control system were, with few exceptions, unsuited to the task.

As the war progressed, changes were rapidly instituted to correct the most crippling shortcomings. By 1944 the Soviet system had become extremely effective, and the lessons learned from that wartime experience have played the dominant role in shaping the Soviet command and control system of today. Soviet experience in the Great Patriotic War has assumed almost dogmatic authority. The harshest lessons are the longest remembered.

A. COMMAND AND CONTROL CATASTROPE: 1941

Soviet historians cope in varying degree with the chaotic response to the German invasion, since the facts do not reflect favorably upon the wisdom and preparation of the country's leadership. Popel, writing in the mid-seventies, comments modestly [Ref. 40: p. 7] that "A number of

significant shortcomings was unavoidable... it became clear that the theory and practice of controlling units and large units... had not been thoroughly tested." He, and other historians, go on to assure the reader that, despite a few minor problems, the military leadership responded magnificently to the Nazi challenge.

A more vivid and comprehensive account of the martial catastrophe which actually took place can be found in the memoirs of the officers who witnessed it and participated in the debacle. As part of the de-Stalinization program of the early 1960's, official encouragement was given to the writing of personal memoirs. Politics certainly dictated which of the officers were so honored, but during the years which followed the outpouring of scores of books has produced a rich and credible source of historical data. Erickson [Ref. 41] and Werth [Ref. 42] drew most heavily on this material in writing their comprehensive and critical accounts of the early war years.

Marshal Eremenko was the most outspoken critic of the way Stalin and the High Command conducted the defense of the USSR. He reported [Ref. 43] that all vestiges of troop control were lost during the first weeks of the war. In some armies, it was never recovered.

Among the shortcomings which crippled the Soviet response to the invasion were the general inexperience or incompetence of many Soviet commanders; the lack of adequate

communications, command facilities, and procedures; and the inhibition or repression of commanders' initiative.

1. The Commanders

The basis of any command and control system is the decisive exercise of legally vested authority by a commander of forces. The talents and training of an individual officer, his experience, his familiarity with his troops and subordinate commanders, and his relationship with his superior chain of command are critical factors affecting his ability to command successfully.

Two factors significantly degraded the quality of the Soviet officer corps on the eve of World War II. The first of these was the Great Purge. The second was the turbulence in the assignments of the remnant.

a. The Purge

During the period 1935- 1941, Stalin presided over a literal decapitation of the Red Army. In a brutal effort to firmly entrench himself and his circle in power, thousands of the most gifted and productive leaders in the USSR were summarily executed or imprisoned. Anyone who through ability or inclination posed a threat to Stalin was removed. Arrests were arbitrary and there was no appeal. The military was hit the hardest of all, starting with Marshals and reaching down through the field grades. It has been estimated that some 75% of the officers in grade of Regimental Commander and above were taken during the purges.

The most immediate impact of the purge was a vacuum in the higher grades. Biriuzov [Ref. 44] described the headquarters of the 30th Division upon his assignment to its staff. As all the senior officers had been taken, a major was acting Division Commander. Promotions came rapidly to the survivors, who unfortunately were the blander and less aggressive officers. Promotion did not compensate for experience and training. By the fall of 1940, a sample of 225 Infantry Regiment commanders revealed that not one of them had completed a full course of instruction at a military academy. Less than 10% had received any training above a junior lieutenant's course. [Ref. 41: p. 20].

The purge resulted in many strange appointments, where men with proven talents in one area were given elevated positions in an unrelated area. Colonel Starinov, [Ref. 45: p. 74] a railroads officer and a specialist in mines, describes how, upon his return from Spain, he was offered a posting as Chief of Communications for a Military District. His old friend, Brigade Commander Kriukov (also a railroader) tried to persuade him as follows: "Do you think it is easy for me to be Chief of Red Army Communications? Ah, Il'ia! You know I'm a line officer and don't have any experience in administering communications... The ranks are thinning."

Fortunately for some 4,000 higher ranking officers, it soon became apparent that the 'severe shortage

of trained commanders' required the rehabilitation of the most talented and less irrevocably purged of the officers. Marshal Rokossovskii, who lost three years and all of his teeth to the purge, was one of those rehabilitated. Although the patriotism of these officers was probably not eliminated by their mistreatment, there were other undesired consequences. As Biriuzov noted [Ref. 44]:

We had quite a few victims of Stalin's arbitrariness among our high ranking officers. They had come to field formations straight from prison. Some of them later became remarkable military leaders, commanding troops with skill. But some lost forever the capacities of full-fledged commanders. The moral and often serious physical trauma that they suffered in jails and camps destroyed the will power, initiative, and decisiveness so necessary to a military man.

b. Command Turbulence

The pre-war years, and the first few years of the war itself, were characterized by frequent and wholesale shuffling of assignments of top Red Army commanders. Kuznetzov [Ref. 46] attributed this turbulence directly to Stalin's superficial and capricious approach to military leadership. . .

Stalin had surrounded himself with his old comrades in arms from the Civil War days, when he had been a commissar with the First Cavalry Army. Marshals Voroshilov, Budennyi, Timoshenko, and Zhukov had all served in that army. This common heritage ensured that they would survive the purge, while more competent officers would not.

The Finnish War revealed the shortcomings of the outmoded doctrine and tactics which had been re-instated in the Red Army after the purge of Marshal Tukhachevskiy and the other innovative military theoreticians in 1937-38. Drastic reorganization was ordered to accomodate new combined arms tactics and to re-establish large armored formations.

An extensive shuffle of commanders took place as incompetent, or simply unsuccessful, commanders were removed and new ones installed.

Less than one year after the Finnish War, and in the midst of a frantic reorganization effort throughout the Red Army, another drastic re-shuffle took place. [Ref. 47: p. 54]. The occasion was a month-long conference in Moscow, called to study operational theories and to hold staff exercises. At the conclusion of the conference, many of the key positions in the General Staff and the leading military districts were shuffled.

While the conference in Moscow was going on, preparations were afoot in Berlin for CTTC, the plans for the campaign against the USSR. Colonel General Halder observed [Ref. 41: p. 46]: 'Die Rote Armee ist fuerherloes.' (The Red Army is leaderless.)

Changes in command of fronts, armies, and divisions occurred in the first month of war all across the line of engagement as commanders were killed, captured, or

shot for treason. Erickson [Ref. 41: p. 491] recorded a partial list of senior commanders court-martialled in July 1941. At least two division, three corps, one army, and one front commander were lost immediately. In most cases the replacement commander was required to take over in mid-battle, with no appreciation for the tactical situation or the capabilities of his subordinates.

In addition to the turbulence caused by losses, desperate reorganizations were attempted in the first weeks of the war. General Yeremenko, summoned from the Far East to command the Western Front, was replaced three days later by the Defense Commissar, Marshal Tiroshenko [Ref. 41: p. 159]. Shtemenko recalled his discomfort with the changes in the field and in the Headquarters [Ref. 9: p. 35]: "This top level reshuffle in the first days of the war was inexplicable... it put us on edge."

It frequently happened that senior officers would be reassigned with no notice. General Tulienev, who was in command of the Moscow Military District until the day of the invasion, recalled his astonishment when Stalin ordered him to assemble a staff from his district personnel and leave immediately for Vinnitsa. There he was to establish the Southern Front out of what had been the Odessa Military District. (The expected pattern for mobilization would have simply been for the Odessa District commander to

convert his existing headquarters into the front headquarters, under his own command.)

Turbulence in key positions generally declined as the war progressed, but Shtemenko described another example indicative of the degree of instability. [Ref. 48] The Chief of the Operations Directorate was one of the key advisors to the Stavka, yet during the period June through December 1942, it was held by three generals (one of them held it twice) and, in the periods between their 'permanent' appointments, was held 'temporarily' by three others.

The degree of instability in the Red Army caused by the constant turnover of command and key staff personnel is incalculable. The efficiency of any commander depends to a large degree upon how well he knows the talents and shortcomings of his subordinates and staff, and how smoothly he can orchestrate their efforts. It is difficult to maintain continuity during transitions in peacetime. In war, it is costly as well.

2. Police-State Command and Control

The repressive and fearful relationship between the strategic leadership and the military forces played a significant part in degrading Soviet command and control during the first months of the war. The German Army's incredible success against the Red Army owed much to the distrust, secrecy, and terror created in the Soviet forces by Stalin's own security apparatus.

a. The Secret Police

The military forces had, since the days of the twenties been provided with 'Special Sections' of secret police. They were part of a completely separate organization, independent of the military chain of command, which was controlled by the Chief of the secret police, the NKVD. Charged with supervision of the loyalty of all military personnel they were assigned at times down to battalion level, but usually at regiments and above. [Ref. 47: n. 14, p. 566] In addition to these elements, some 200,000 NKVD personnel were formed into special military formations for internal and border security.

At the outbreak of hostilities, the border was guarded almost exclusively by troops of the NKVD. The regular Red Army formations were held back, typically some 10 km or more. As Nekrich noted [Ref. 16: n. 72, p. 42], there was no horizontal reporting between the NKVD units on the border and the army divisions in the vicinity. Commanders of the army divisions did not always receive critical information about border activity -- reports went straight to the Main Directorate of Border Troops in Moscow. From there it would be reported to the General Staff, which would decide who needed to see the information. If accepted as factual and important, it would then, at least in theory, be transmitted down to the local division commander. The horizontal path for information exchange at

the levels of Border Security District -- Military District was evidently little used.

Bitter rivalry between the NKVD and the Red Army literally roused hatred. Not only at the beginning of the war, but throughout its course, this served to divide and vitiate the Soviet forces at critical times. During the German rush towards Moscow, for example, NKVD units detained a special detachment of demolition experts. They thought it suspicious that these Russian officers should be heading for key bridges with explosives. [Ref. 41: p. 154] "We have met the enemy, and he is us!" [Ref. 49].

b. Information and Intelligence Flow

Stalin's regime suffered a chronic failing of totalitarian regimes regarding intelligence and threat analysis. When debate is forbidden and the preconceptions of the despot are unassailable, it takes a very brave or very foolish man to challenge convictions with mere facts. Presenting Stalin with information which did not coincide with his expectations was dangerous -- it was too easily viewed as a challenge to his authority or his intellect.

There is ample evidence from many independent sources which attest to the warnings given Stalin on the eve of the invasion. From England, Switzerland, the U.S., and other countries, from his own diplomatic corps, from his excellently placed intelligence agents, and from his commanders on the border, Stalin was inundated with

virtually indisputable intelligence about the 22 June 1941 invasion. Berezhkov [Ref. 50], Boldin and Fedyuninsky [Ref. 42: pp. 145-150] offer evidence of the detailed intelligence which was being conveyed to the High Command. It is likely that the reports were treated contemptuously, not only by Stalin but also by the subordinates submitting them to him.

Subordinates reporting the unexpected were never believed, whether the news was good or bad. During the Finnish War, victory was unexpectedly achieved by the 7th Army under General Meretskov. Voronov, then Chief of Soviet Artillery, was in his headquarters and recalled the disbelief with which the Defense Commissar received Meretskov's good news. Voronov himself finally had to take the telephone and, after being asked three times if the report were really true, was finally believed. [Ref. 51]. Boldin recalls the first day of the invasion, [Ref. 42: p. 151] when Defense Commissar Timoshenko called the Western Military District HQ every hour or so for reports on the situation, but clearly did not believe them. Boldin was telling him that the troops were in retreat, towns in flames, and casualties mounting. Timoshenko was cautioning Boldin to "Remember, no action is to be taken against the Germans without our knowledge... Comrade Stalin has forbidden to open artillery fire against the Germans." Similar incidents were recorded in Sebastopol and Murmansk.

Telegin recalled [Ref. 52] an incident which illustrates the peculiar risks faced by Soviet commanders. On 2 October 1941 he received a report of an armored column twelve miles in length advancing rapidly toward Moscow in a sector which was believed secure. The reconnaissance flight had to return to the column for three consecutive sorties before the intelligence was finally accepted by the General Staff, with "puzzlement and mistrust." Consequently, Stalin himself called Telegin to question the reliability of the report. Beria asserted to Stalin that the report was categorically untrue, as his officers and officials of the Special Sections would have reported such information if it were true. Shortly thereafter, the commander of the air force district (whose pilots had verified the information three times) was called to NKVD Headquarters for interrogation. [Ref. 41: p. 217] There he was threatened with court-martial for spreading panic, for cowardice, and for "damaging the work of the center establishment." The report, of course, had been factual. Unfortunately, the tank column had already taken its objective and invested Yekhnev, as the pilots observed in despair on their third sortie.

c. Secrecy

Soviet operational security was extremely successful, winning grudging praise from the German Generals. Secrecy can only be achieved at cost, however -- information

must be severely restricted to a select few. Soviet flexibility, preparedness, and responsiveness was hindered by depriving key commanders of the most elementary warnings and intelligence. Two examples are illustrative of the degree of secrecy.

General Yeremenko was given command of the 1st Red Banner Army, on the Manchurian border, in January 1941. While preparing to depart from Moscow to assume his command, he visited the General Staff to discuss operational planning and the mission of the army. [Ref. 41: p. 55]. The Operations Section refused to tell him whether he would be expected to fight offensively or defensively. "Such highly secret information, he was given to understand, could scarcely be imparted to a formation commander."

General Kazakov recalled his ignorance of the imminent invasion [Ref. 53]. As Commander of the Central Asian Military District, he routinely traveled to Moscow to confer with the General Staff on matters pertaining to his district. Flying to Moscow in mid-June 1941, he was startled to observe an entire army moving by rail from the neighboring Transbaikal District towards the west. Upon arriving at the General Staff, his queries about the movement and the events which may have prompted it were met with silence. No one would tell this District Commander that war was about to start, and he did not learn of it until after the invasion a week later.

d. Recrimination

For the leaders of the Red Army, failure had grave consequences. Stalin was quick to attribute treasonous crimes to those who failed to perform as he had directed, whether they were actually at fault or not.

Voronenov recalled [Ref. 51: p. 211] that in the early days of the war, reports from the fronts were extremely late and contained little factual information. As the front commanders were themselves cut off from their armies, and the armies in turn had lost all control of the divisions, this could have been expected. Stalin's directions were also not unexpected: "Punish the people who do not wish to inform us about what is happening in their sectors."

Stalin's heavy-handedness was enforced at the unit level by the political commissars. At first there was much of the 'discipline of the pistol' reminiscent of the Civil War years. Popov was present with his division commander after an unsuccessful offensive operation early in the war [Ref. 47: n. 70, p. 587]. They were startled to see a procession of staff cars arrive at their command post -- it was the front commissar and the military tribunal. They had come to summarily try, and then execute, the division commander for his failure. After much recrimination, the division staff was given another chance: "If by evening you

occupy Dubno you will receive a decoration. If you don't -- we will expel you from the party and shoot you."

General Pavlov did not escape so easily. He had been nick-named 'the Soviet Guderian' after some minor success with the Loyalists in Spain, but the Western Front had crumbled under his command through pure incompetence. He was executed for treason during the second week of the war. The effect on the rest of the staff at his headquarters was numbing. It was like the purge all over again. "All remembered 1937 too well." [Ref. 45]. Starinov describes a tragic-comic incident which occurred shortly thereafter. Because he was travelling around the border areas he had been given an escort of two NKVD officers to expedite his freedom of movement. Upon reporting to a very senior officer, he was amazed to see the man leap to attention and, sweating profusely, start making excuses for himself. It took a moment for Starinov to realize that, because of the NKVD officers escorting him, the general thought he was about to be arrested.

e. Command Initiative

Bialer [Ref. 47: p. 38-39] has described the fearful state of submission which overtook top field commanders, and their unwillingness to risk Stalin's displeasure at any cost. It was better to die in battle, and take your soldiers with you, than act contrary to

orders. No matter how futile or idiotic the operational directives were, they were obeyed without question.

The fresh memory of the Great Purge reinforced by the fate of frontier commanders executed for alleged treason at the start of the war contributed to a situation where not only was sabotage of Stalin's orders considered unthinkable, but even legitimate questions concerning the wisdom of operational decisions in the planning stage were risked by few generals and pursued after rejection by almost none.

Thus offensives were launched willy-nilly in the face of unknown forces, huge formations held their ground and watched themselves becoming encircled, and all along the front men stood and fought in the most inappropriate of defensive lines.

Kirponos [Ref. 41: p. 91] moved some of his forces into more favorable positions on his own initiative, in mid June 1941. He commanded the critical Kiev Military District, and was himself convinced that attack was imminent. Unfortunately, the division movements were observed by NKVD border troops, reported to Beria, and thus to Stalin. Kirponos was immediately ordered to restore his forces to their previous positions.

Had decisive orders been forthcoming from the General Staff, the repression of initiative would not have had such severe consequences. Initial warnings of a possible surprise attack were actually transmitted just prior to invasion. Unfortunately, the warnings bore the

caveat that no Soviet troops should respond to provocation. In Sebastopol, when the colonel in charge of air defense was told to open fire on the German planes which were at that moment mining the channel, he obeyed the order reluctantly. He insisted upon writing it down first in his log, and warned his commander that he would not be held accountable for passing on that order.

3. Ideological Impedimentia

When Lenin and Trotsky established the organization of the Red Army in 1917, it was an instrument of revolution. It had to be formed "by the working class in alliance with the peasantry, under the leadership of the Communist Party."
[Ref. 54] As such, it had to reflect fundamental differences in the forms of control, distinct from those used by the "bourgeois armies."

As Romanov wrote [Ref. 55]:

The creation of a socialist system of military control, like the organizational development of the Soviet State's Armed Forces as a whole, was something new... there were no practical models in existence upon which the work could be based. The old military control system was destroyed in the revolution.

The control systems established in the Red Army were unique to modern armies. But the system of commissars, designed to insure political control over the decisions of the commander, and the military councils designed to insure collective decision making in operational matters, had

existed in somewhat similar forms in France in 1793 after the revolution had established a state "of the people." These entities legitimize the Soviet form of control by embodying Lenin's dictates on centralization, collective control, and political integration.

a. Commissars

Commissars, or political overseers, had been assigned to Red Army units periodically since the days of the revolution. During the Civil War and the wars of intervention, the Bolsheviks had been forced to rely on "military specialists" -- ex-Czarist officers -- for military leadership. There were simply no other Soviet citizens with the training to effectively command troops. In order to provide continuous party supervision of these officers, and incidentally to keep them from deserting, Lenin and Trotsky dictated that trusted and dedicated party men would share command authority with them [Ref. 56]. Having recently conspired so successfully in the overthrow of one repressive regime, and being opportunists themselves, it was only prudent that they take these precautions.

Initially it was intended that the commissars would have no influence on the conduct of tactical operations, other than certifying that no counter-revolutionary activity was being undertaken. They were charged with indoctrination, morale building, and disciplinary functions. In the earliest days they also

served to protect the military specialists from the troops, who often resented their return to authority. Eventually, the commissars came to share the operational decision-making authority of the commander, who could not issue an order without the signature of the commissar.

The negative effect of the commissar upon the initiative and freedom of action of the military commander can not be overstated. As commissars became better educated and acquired more military training themselves, they began to usurp more of the commanders authority. Similarly, as more officers joined the ranks of the party, the "unity of command" phenomenon appeared. This occurred when an individual was considered trustworthy enough that he could simultaneously fill both the commander and the commissar positions of a unit.

The power of the commissars fluctuated depending upon the political stability of the USSR and the relative power of the military and political factions within the Red Army. By 1935 commissars had been removed completely from the command functions, but with the start of the purges in 1937 they were restored to their former powers.

During the Finnish War the commissar system caused great conflict within the army. Commanders complained that the commissars were interfering in operational matters wherein they had no talent or training. As part of the reforms which were initiated after the Winter

war, the commissars were relieved of their control functions and "unity of command" was restored. The official reasons for this change were summed up by Timofeyechev [Ref. 34: p. 57]: "The harmonious joint work of commanders and commissars promoted the growth of command personnel from a military and political point of view."

Less than one month after the start of the war with Germany, the dual command system was again instituted. Due to the reverses of the war, the regime had reason to fear for its own continued existence. The situation was unpleasantly reminiscent of 1917.

The commander and the commissar shared the full responsibility for the execution of military tasks, the training and morale of the troops, and their determination to fight. Timofeyechev explained [Ref. 34]: "The conditions of war, especially during the initial period, complicated the work of commanders and required that they be helped by political workers not only in political areas but also in the military area."

The so-called "fighting commissars" were really charged with two main tasks. The first was conducting surveillance on the commander, while the second was instilling fighting spirit and resolve in the troops. Whether through fear of them, or through successful agitation, or both, the commissars seem to have been effective in heroically spurring the men to feats of arms.

Their adversaries, the German generals, attested to their zeal [Ref. 57: p. 14-15].

The impact of political considerations upon operational matters can not be dismissed lightly. Marshal Bagramian recalled [Ref. 58] an incident which took place in the first few days of the war, at the headquarters of the Southwestern Front. Front Commander Kirponos received an order from the Defense Commissar (Timoshenko) to launch an immediate counter- offensive against the invading Germans. He considered the order absolutely suicidal, given the disarray of his forces and the lack of materiel. He announced to his staff that they would defend instead. Commissar Vashugin then read the order, and told Kirponos that his decision was undoubtedly correct from a military point of view, but that it was incorrect politically. The offensive was immediately launched, with subsequent decimation of the Soviet forces.

The system of commissars was abolished again in October 1942. One of the reasons was Stalin's realization that the reverses of the war were not going to threaten him personally. By 1942 he had gathered personal power even more firmly than before. The disastrous retreats had finally stopped, and the stabilization of the lines in front of the Volga offered assurance that the worst was over. The Russian people had shown an incredible willingness to

sacrifice all for "Mother Russia;" their collective will was focused on expelling the Nazis, not on revolution.

The men who had served as commissars were integrated into the army, either as commanders of units or as deputies for political affairs. Co-signing orders was no longer required, except for those command levels where military councils existed.

b. Military Councils

The Military Councils of the Red Army, like the commissars, were created in the earliest days of the Civil War. They were intended to combine military expertise with political supervision and guidance in the direction of the strategic operations of the military forces. In March 1918 the Supreme Military Council (Verkhovnyi Voennyi Soviet-VVS) had been created to assume leadership of all the armed forces. It was composed of "the military leader" (Trotsky) and two commissars. The council worked so well that the idea was extended to include the collective leadership of the front, which was the Revolutionary Military Council (RVS).

Gripped with revolutionary fervor, political workers at the five armies subordinate to the front created their own army-level RVS's [Ref. 54: p. 15] "This was carried out in spite of the opinion of the RVS of the front which considered the RVS of the armies as illegally arising bodies and demanded their abolishment."

The military councils of the fronts and the armies had wide powers delegated to them by the state. They became, in effect, locally autonomous governing bodies with absolute authority over all persons and enterprises within their sectors. Front councils could on their own initiative remove front commanders, as well as convene ad hoc tribunals for the swift determination of military justice. Although the primary purpose of the councils was to provide collective direction of military operations, they effectively combined state, party, and military functions so successfully that they served as the model for subsequent military organization in the USSR.

Unlike the checkered history of the commissars, the military councils were never abolished. After the war began, the councils retained all of their peacetime authority and also assumed the collective leadership of all combat activity. While the commander always presided over the council, he could not issue orders without the signature of one of the members of the council (one of the commissars) and the signature of his chief of staff. [Ref. 54: p. 21] "This corresponded to the line of the Communist Party of sole responsibility in the Soviet Armed Forces, and at the same time provided collective leadership in making major decisions."

The military council was flexible in composition, additional members being added as appropriate.

Kozlov [Ref. 54] indicates that the commanders of the air force, the artillery, and the rear services assumed duties on the council corresponding to their specialties, and that the work of the council was "precisely allocated" among the members. Routine planning within a member's area was usually accepted as offered, but the council clearly had veto authority: "The most important and complex questions were settled collectively, with the calling in of the executors." [Ref. 54]

The councils would respond to mission tasking by the superior headquarters, prepare a draft plan for the operation for approval by the tasking authority, and then implement as approved. Thus, operations plans at each level were screened and approved at the next higher level.

4. Administrative vs. Operational Preparedness

While the exact date of the impending German attack may not have been known ahead of time by the leadership of the Red Army, there was every indication that such an attack was inevitable. The certainty of coming war makes the Soviet lack of preparedness incomprehensible. Despite the military reforms and reorganizations undertaken in 1940, and the gradual mobilization of the army and the economy onto a war footing, the strategic leadership failed to plan for an operational command and control system.

Danilov addresses a few of the failures [Ref. 59: p. 100]:

In analyzing the structure of the RKKA General Staff in the prewar years, we cannot avoid noting certain omissions and shortcomings in its work. In particular, certain organizational problems as well as questions of personnel, placement, the support apparatus, and materiel were not fully resolved; command posts were not prepared ahead of time in case of war; leadership of the General Staff changed rather often...

The command and control failure was most devastating in three critical areas. There was no formal organization of the strategic leadership to conduct operational control over the forces; no operational command facilities were prepared ahead of time; and there was no adequate preparation for wartime communications among the divisions, armies, fronts, and the General Staff.

a. Disorganization of the Strategic Leadership

Before the war, the Soviet Union's top defense organization was simply organized into two commissariats (ministries), Defense and Navy. The commissariats, similar to the U.S. departments, were subordinate to the Council of People's Commissars. Each commissariat included a Main Military Council as the collective policy-making body, the General and Main Naval Staffs as operational working agencies, and the various branch and service directorates for promulgation of doctrine and procurement of materiel.

The difficulty with the existing organization arose from the lack of any single controlling body with authority over both the army (which included the air force) and the navy. An additional complication was Stalin's de

facto role as absolute dictator, which had not as yet been legitimized institutionally. Command authority was nominally with the Defense and Navy Commissars, reporting to the Chairman of the Council of Commissars. During the war with Finland, Molotov had been Chairman, and Stalin had simply been Party General Secretary.

Admiral Kuznetsov, Navy Commissar, was quite critical of the failure to clarify the strategic leadership organization during the Finnish War. Major decisions were made by Stalin in camera with the Defense Commissar and the Chief of the General Staff. Since the Navy was separate, they were forgotten players. [Ref. 60]:

There was no organ to coordinate the operations of the army and the navy... the navy men found themselves in an awkward position... the Finnish Campaign had shown that the organization of military leadership at the center left much to be desired... one had to know in advance who would be the Supreme Commander in Chief and what apparatus he would work through: was it to be a specially created organ or the General Staff as it had operated in peacetime?

A special 'Headquarters, High Command,' had been proposed in 1937 as a means of directing all of the armed forces. According to Romanov and Pavlov [Ref. 55: p. 3], a draft plan had been prepared by the General Staff for creating this headquarters, and exercises had been planned:

It was not possible to conduct these, however. Due to a number of circumstances planned measures to prepare the creation of the HQHC and its agencies were also not

considered. This matter was accomplished on a practical basis when the war was already in progress.

Unfortunately, the Soviets did not implement these plans, even after the harsh lessons of the Winter War. In May 1941 Stalin officially replaced Molotov as Chairman of the Council of Commissars. The system of leadership did not, in effect, change, because Stalin was still making all of the decisions in the Defense Commissariat. Kuznetsov's position became still more complicated, as Molotov and Zhdanov were the other members of the Navy council but would not make any decisions for fear of Stalin. The Navy was excluded from the councils of war. Institutional roles were obscure [Ref. 46: p. 348]:

Before the war, neither military institutions nor high defense officials had clearly defined rights and obligations. Experience has shown that in questions of supreme importance, the smallest ambiguity is intolerable. Each official should know his place and the limits of his responsibility. The war caught us without a properly prepared organization of the highest military leadership. Only with the start of the war was it hastily organized. Undoubtedly this should have been done long before, in peacetime.

The disorganization at the top had the most severe consequences for the commanders in the field, especially during the first weeks of the war. Improving the organization took time and attention, which was purchased literally with millions of lives and hundreds of kilometers of territory. Local commanders, ordered not to act without

specific orders from the "top," were prevented from taking effective independent action while they waited.

The decapitation was most crippling to the navy. Basically a coastal defense force, it was designed to support the fronts by defending their seaward flanks. It was subordinate to the army, not only at the center, but also in the field. Kuznetsov recalled in despair [Ref. 46: p. 350]: "We were perplexed by the question: To which Army Group [front] would one fleet or another be subordinate in time of war? How would the coordination be arranged?"

b. Lack of Command Facilities

One of the most extraordinary oversights of the Soviet command and control system as it existed on 22 June 1941 was the lack of command facilities. This was most acute at the top, where no thought had been given to establishing an operational command center.

On the morning of the invasion, Marshal Voroshilov, who was the senior Red Army officer, asked the Commander of the Moscow Military District, General Tulienev, "Where has the command post for the Supreme Commander been set up?" [Ref. 61]. Tulienev recovered his composure enough to offer his own District Headquarters to the Supreme Commander -- whoever that might be. His headquarters was at least guarded.

The situation grew worse when the bombing of Moscow began in late July. Shtemenko described the use of

the Byelorusskaya Underground Station as the General Staff command post [Ref. 9: p. 38]:

All night the central command post would be functioning on one half of the platform, while the other half, separated from us by only a plywood partition, would at dusk fill up with Muscovites... such conditions were not, of course, convenient for work..."

A permanent facility was eventually established in the Kirov Underground Station, which was closed to the public. Although trains still ran on the tracks through the station, they no longer stopped there, and a plywood partition was erected between the command center and the tracks.

The three fronts fared somewhat better than the center, as they had designated field locations prepared for their headquarters. These did not include any command post vehicles, however, and tents were the sole arrangements for sheltering the commanders.

c. Inadequate Communications

At the outbreak of the war, the Red Army was extremely poorly equipped with communications equipment. What signal equipment it did have was not well suited to the demands of contemporary warfare. In addition, there was an unwillingness on the part of commanders to use radio. Basic inadequacies existed in doctrine, equipment, and training.

For carrying operational traffic the Soviets relied exclusively upon the civil telephone and telegraph

network operated by the People's Commissariat for Communications. This was entirely a landline network, primarily centered at Post Office facilities in cities and towns. [Ref. 41: p. 73].

Marshal of Signal Troops Peresypkin [Ref. 62: p. 9] explained the rationale for this approach:

Prior to the war it was assumed that in the course of combat operations headquarters of operational formations would be sited at relatively large distances from the battle line and that they would displace at considerable time intervals. It was assumed that they would communicate with the General Staff, adjacent units and subordinate troops chiefly with the aid of wire equipment. The war introduced substantial changes...

In the first days of the war, the front headquarters were forced to move once or twice a day. The field command post for the Southwestern Front had been located in advance at Tarnopol', over 130 kilometers from the border with the Third Reich. Tarnopol' was captured in the first week of the war. During the period 4 - 6 July 1941, this front headquarters displaced over 100 kilometers per day. Relying almost entirely on the wire integration with the civilian telephone plant, with no mobile communications centers, and with personnel who were not familiar with the concept of maintaining continuous communications during displacement, it is not surprising that there was no stable command and control of or by the fronts and armies.

It was not until the fall of 1941 that the Main Signal Directorate of the Red Army issued a directive outlining the necessary considerations for maintaining continuous communications during a move of the command center. [Ref. 62: p. 10]. (The substance of the method was simply to move half of the communications equipment and personnel to the new location and get set up before moving the commander).

The extreme reluctance of Soviet commanders to use radio even when they had them is revealed in the special order issued by Stavka in May 1942. By this time the need for radio communications had become evident and some sets had been distributed. Peresypkin notes that army and division commanders were not insuring they had radios with them at all times, and that "Many army and division commanders prohibited the use of radios for fear of giving away the position of their headquarters." [Ref. 62: p. 12] The measures taken that month are described:

[Stavka] issued strict orders to stop neglecting radio communications; it made the chiefs of staffs of the fronts and armies personally responsible for uninterrupted communications with higher headquarters and regular communication of information by radio on their operations; personal radio sets were assigned to front, army, and division commanders, which were to be with them at all times, during all movements; important organizational measures were specified for ensuring execution of this order (assignment of personal radio sets, assignment of top radio operators to this equipment, assignment of [Operations Directorate personnel] and cryptographic sections to radio sets, provision of means of transportation, etc).

Of all the fronts, only the Northwestern was equipped with functional radio equipment. It was scanty but useable. LtGen (Signals) Kargopolov wrote despairingly about the refusal of some of the staff officers to use radio, when the landlines had already been cut. [Ref. 41: p. 143] In the Western Front, there were not even radics. [Ref. 41: p. 117]. Massive German dive bomber raids had attacked signal points, along with ammunition and fuel dumps, as the opening strikes in the war.

The disruption in communications on 22 June was practically total. Boldin recalls sending his only two remaining planes as couriers, from his location at the 10th Army Headquarters to Front HQ in Minsk. [Ref. 42: p. 154]. He needed gasoline desperately but could not communicate any other way.

The communications disruption left the General Staff in ignorance of the attacks; it was mid day before Timoshenko was dissuaded from his conviction that the attack was merely a provocation. Because of the lack of information, the orders issued from the Defense Commissariat bore no relation to reality. Some commanders, like Pavlov, participated as willing pretenders in a fantastic charade, ordering non-existent formation of troops about the Western Front. [Ref. 42: p. 154].

Shtemenko's description of the General Staff activities in the first weeks of war is illustrative of the

desparate lack of information at the strategic levels. Members of the staff assigned to specific sectors, where communications had been completely lost were for several weeks sent out in reconnaissance aircraft to personally

... verify the actual position of the front lines of our defenses, or to ascertain whether the enemy had captured this or that populated area... Such flights were frequent to the Western Front, where the position was becoming increasingly difficult and communications could not be stabilized. [Ref. 9: p. 34]

This was not the only method which was used by the General Staff to obtain information. Shtemenko also related the use of the civilian telephone system to simply call the executive committees or village Soviets of the towns in the path of the advance. He recalled [Ref. 9: p. 36] that this was quite a reliable expedient in the early days of the war. Officials usually could tell him which nearby localities had been captured, and which were still free.

General Staff ignorance of even the location of the front and army headquarters locations persisted in some cases into July. [Ref. 9: p. 140] Marshal Zhukov related a sad incident when he visited the headquarters of the Reserve Front in search of its commander, Marshal Budenney. He was not there, and the Commissar (the hated Mekhlis) had moved the command post since he left. Zhukov went out looking for

him, finally locating him in Malojaroslavets. Zhukov recalled [Ref. 63: p. 40]:

When I told him about my visit to Western Front Headquarters, Budenniy said he had been out of touch with Konev for the last two days. While he was visiting the 43rd Army, his own headquarters had moved and he did not know where it was. I told him that it was beyond the railroad bridge across the Prtva River, seventy miles from Moscow, and that they were looking for him.

Marshal Zhukov was at that time the Chief of the General Staff.

B. WARTIME COMMAND AND CONTROL

The confusion and disorder which characterized the first period of the war was overcome gradually. By the close of 1942, the Soviet command and control system had developed into a workable one. By the end of the war, it represented an effective solution to the problems of contemporary warfare. Many of the peculiarities of the present day approach derive from wartime experience.

1. Strategic Leadership

The confused strategic organization which had so debilitated Soviet responsiveness in the initial weeks of the war was corrected in increments during July and August 1941. In peacetime, Stalin had drawn all channels of information directly to himself; all channels of decision and control emanated from him as well. After an unexplained period of withdrawal which lasted until 3 July, Stalin

systematically institutionalized his *de facto* role as the absolute decision making authority in the USSR.

a. The Control Structure

Before the war, Stalin had nominally occupied only a single position -- Secretary General of the Party. In April 1941 he took over from Molotov the Chairmanship of the Council of People's Commissars. This was a prophetic shift from party to government. By the mid- August 1941, the final arrangement of control entities had been established. These were the State Defense Committee, the Headquarters of the Supreme Commander, and the General Staff of the Armed Forces.

The State Defense Committee (Gosudartsvennyi Komitet Oborony: GKO) was established 30 June with Stalin as Chairman. [Ref. 55] The GKO legalized the centralization of the nation's economic, political, and military leadership into a single body. Its membership of five (later eight) was drawn exclusively from Stalin's closest and most faithful associates on the Politburo. With the exception of the political marshal, Voroshilov, the GKO was a civilian entity. During the war the GKO preempted the role of the party Central Committee, which met only once, in 1944 [Ref. 47: p. 569]. While the GKO functioned as a collective body, the decision authority was all Stalin's. Soviet sources frequently mention the high number of decisions made by the GKO -- 9971 -- approximately two-thirds of which

pertained to military production and logistics. "A great number" of the remainder addressed organizational structure and the command and control of the Armed Forces [Ref. 64].

The Headquarters of the Supreme Commander in Chief (Stavka Verkhovnovo Glavnokomandovaniya - 'Stavka') included the top military leaders as well as the members of the GKO [Ref. 41: p. 138]. The Stavka was charged with "directing the Armed Force, planning the combat work of the army and navy, and distributing personnel and means among the fronts." [Ref. 55: p. 5]. Basically, this body directed strategy and allocated military resources. Stalin, named Supreme Commander in Chief on 8 August, used the Stavka as a collective, consultative body. The Stavka met every evening to receive the day's reports and issue directives to the General Staff. The Stavka frequently called in commanders and military councils of fronts and of branches of Armed Forces, the commanders and staffs of the main directorates of the Defense Commissariat, and members of the General Staff. As Romanov stated [Ref. 55]:

The work of the Headquarters [Stavka] was based on a combination of collective decision making and one-man command. The authority to make a final decision, however, remained with the Supreme Commander in Chief at all times.

The General Staff of the Armed Forces was created on 10 August. This combined the staffs of the arms

and services. This body became the main working body of the Stavka.

b. Stalin's Role

While Stalin had been absolute in power before the war, his authority had been discretely masked by his deceptively modest role as Party General Secretary. With the war, he created multiple state organizations, all chaired by himself, and decision-making shifted from the party to the government.

Stalin's authority within each of the state control organs was complete. He was Chairman of the Council of People's Commissars, he was Defense Commissar (as of 19 July), he was Chairman of the GKO, head of the Stavka, and Supreme Commander of all Forces. Aspaturian noted [Ref. 65] that the membership of the various organizations was overlapping, the delineation of responsibilities and authority deliberately blurred. These various entities all came to function as staffs for Stalin. He encouraged rivalry and intrigue among them, so that their interaction would be disjoint. All decisions were thus forced to the top for his resolution. As Bialer observed [Ref. 47: p. 341]:

Soviet military memoirs leave no doubt that all information on military operations and internal affairs flowed into Stalin's office... and all decision on both military and civilian matters of even secondary and tertiary importance flowed from there.

Stalin had a near-pathological inability to allow subordinates, no matter how little distrusted, to make a decision of substance. The consequences were both positive and adverse.

Resolution of primary questions was swift, literally single-minded, and unquestionably authoritative. Stalin relied heavily on the judgement and advice of subordinates, but all decisions, once made, were final. There was no appeal. The negative consequences arose from the imposition of a single individual's prejudices and judgemental quirks on all decisions, the stifling of subordinates' initiative, and substantial delays in solving problems of secondary importance.

2. The General Staff

The General Staff was exclusively occupied with strategic and operational matters. It was relieved of duties related to the marshalling of resources for the war, which were provided by two other organizations also reporting directly to the Stavka. These were the Main Directorate of Rear Services, which handled logistics, and the Main Directorate of Unit Activation and Training, which created manpower reserves. These two directorates "stocked the shelf" for the Stavka, which then released resources to the General Staff for specified operational purposes. [Ref. 65: p. 9].

The functions of the General Staff are indicated by Romanov [Ref. 55: p. 8]:

It was charged with controlling and rendering assistance to front and army staffs in the planning and supervision of operations, preparing requisitions submitted to industry for the production of military goods, studying and summarizing the operational and tactical experience of the war and disseminating it in the forces, and preparing directives and orders issued by the [Stavka].

a. The Operations Directorate

Operational control over the forces of the USSR was exercised by the General Staff through its Operations Directorate, the Chief of which was also simultaneously the Deputy Chief of the General Staff. This arrangement had developed before the war to satisfy specific shortcomings which prevented the staff from exercising continuous troop control, even under peacetime conditions (Maneuvers and exercises). The Operations Department then had had no direct influence on communications elements and was not participating in the intelligence cycle. To correct these deficiencies, the Operations Department had been elevated in importance (becoming a Directorate). Henceforth, as Danilov wrote [Ref. 59: p. 96]: "Questions of the organizational service of communications, the information and intelligence service, and troop reconnaissance were concentrated in the Operations Directorate of the [Army] General Staff." These measures significantly enhanced staff control over

operations, and were retained when the combined General Staff of the Armed Forces was created in 1941.

The memoirs of Shtemenko, who served as Chief of the Operations Directorate during the war, are the most valuable source of detailed information on individuals, procedures, and events within it [Ref. 9: Ch. 6]. The directorate was divided into sectors or branches corresponding to each front. The sectors performed the bulk of planning and operational staff functions for the fronts and also for the armies assigned to the fronts. Personnel in the sectors were called "directors."

Specific directions for the conduct of operations would be given to the General Staff by the Stavka. The Operations Directorate would then pass the missions to the various fronts, by way of the directors. Then the front military councils would, "within the limits of their authority," make detailed plans for the objectives, missions, and coordination of their armies [Ref. 55: p. 9]. Once fully elaborated for the armies, the front's plans were submitted to the Operations Directorate for approval. Disagreements between front commanders and their "directors" were referred to the Stavka for resolution. Commanders and other members of the military council would take the final front plan, as approved, and work with the commanders and councils of the armies in developing detailed plans for the divisions. Shtemenko recalled that [Ref. 9: p. 139]

"Differences of opinion usually arose not over the concept of an operation or how it should be conducted, but over the strength of forces required and their logistics." Reserves of men and material were controlled by the Stavka.

b. Reporting to the Stavka

The detail and frequency of the tactical and operational reports demanded by Stalin are significant. They illustrate not only the extent to which centralization was enforced but also the redundancy and independence in reporting which characterized Soviet command and control during the war.

Shtemenko [Ref. 9: Ch. 6] gave detailed accounts of the daily routine of the General Staff in preparing reports for Stalin and the Stavka. During the night, the officers assigned with the forces would report to the Operations Directorate by telephone. While these reports were being analyzed and compiled in the morning, the Chief of Operations would personally call the front Chiefs of Staff to verify, cross-check, and amplify the reports. Situations at the regimental level and above were reported. The sector chiefs and the Chief of Operations kept personal maps, updated constantly, for each front. These were of scale 1:200,000, or about 5 kilometers per inch.

Around 1000 each morning Stalin would call the Chief of Operations by telephone and receive a detailed report on the activity in each of the fronts. Only after he

had reported to Stalin would the Chief of Operations give the same report to the Chief of the General Staff. This was around 1200. It is interesting to note that Stalin specified a rotating rest schedule for all key personnel of the General Staff. It was specifically arranged so that the first report of the day -- 1000 -- was submitted during the rest period of the Chief of Staff. The second report of the day -- at 1500 -- was submitted while the Chief of Operations (who was simultaneously Deputy Chief of Staff) was having his rest. This procedure allowed Stalin to cross-check his two key military advisers, to insure by independent reports that nothing was consistently being misrepresented to him or hidden from him. At 2300, both the Chief of Staff and the Chief of Operations would report to Stalin in person, presenting the Stavka with a 24 hour summary of activity from the front maps. Around 2400, telegraphed activity summaries would be received from the fronts and presented to the Stavka -- these were signed by the military councils of the fronts.

Thus, during each day of the war, Stalin received four reports on the activities of each front. The first was telephonic, from the Chief of Operations. The second, also telephonic, was from the Chief of Staff. The third was an in-person briefing from both of these individuals, given from their maps. The fourth report was telegraphic, from the military councils. In addition, a

fifth report was given to him independently of the military reports, and never in the presence of the Army leadership. This report was from the Commissar of Internal Affairs, who was a member of the GKO. It reflected the observations of the NKVD regiments and the Special Sections, independently reporting on the same fronts.

c. Officers of the General Staff

Because of the difficulties experienced by the General Staff in obtaining accurate, current information on the status of their own forces, a special body of liaison personnel was created especially to feed it information. Stalin named these men the "Officers of the General Staff." This was the first time the word "officer" had been used in the entire history of the Red Army [Ref. 9: p. 141], an indication of the special status they enjoyed. They were assigned to a separate directorate of the General Staff initially, but later came under Operations.

Three officers were allocated to serve with each army headquarters, while two were allocated to each division, corps, and front headquarters. [Ref. 66: p. 38]. They enjoyed their own chain of command which was parallel to, but independent of, the force's chain of command [Ref. 9: p. 141]. The number of officers used this way peaked at 240 in December 1942. [Ref. 67: p. 45]

The officers of the General Staff served to "continuously provide General Staff presence for information

and control purposes... These officers were the 'eyes and ears' of the General Staff in the operating forces." [Ref. 66: p. 38]. The need for accurate reporting, direct to the General Staff, was filled by these officers independently of the force command structure. They checked up on the condition and position of the troops, and the logistic support provided the forces. Shtemenko stressed that an officer of the General Staff "had the right to report only what he had seen with his own eyes; he was not allowed to quote other people or headquarters documents." [Ref. 9: p. 141].

It seems clear that the 'Officers of the General Staff' had been required because the strategic leadership did not trust the commanders and military councils of the higher echelons to report accurately and often. Golubovich wrote [Ref. 67: p. 47] that one of their most important missions was "...to check on the execution of orders and directives." These were specifically combat missions. Much "identification of deficiencies" in the conduct of operations was uncovered, as well. By mid-1943, the need for constant supervision of the forces had somewhat abated, as headquarters and commanders had by then learned "to analyze the situation properly." [Ref. 9: p. 141] They were used extensively with the 'liberated' armies -- Polish, Czech, and Rumanian -- as they were integrated into Soviet operations.

Shtemenko indicates that the officers "sometimes encountered obvious hostility at the front. Some commanders and chiefs of staff referred to them scornfully as overseers." [Ref. 9] This reaction would not seem to be an unexpected one. On at least one occasion, the presence of these officers reflected the lack of trust and confidence in the commanders. The commanders' confidence, initiative, and efficiency were severely affected by this arrangement.

3. Organizational Flexibility

The organizational force structure of the Red Army was in a continual state of flux throughout the war years. In the first years of the war, changes were made in a desperate effort to compensate for shortcomings. There was inadequate material and supply, there were too few reserves, and there were not enough highly qualified commanders. In seemingly arbitrary fashion extraordinary experiments were made in an attempt to optimize the use of limited resources.

What had earlier been tried in desperation was later applied to good effect during the massive offensives that carried the Red Army from the Volga to Berlin. Stalin found that a studied and purposeful flexibility in organization could do much to overcome the uneven abilities of his commanders and the shortfalls in materiel.

a. Representatives of the Stavka

Aside from the brief existence of 'theater' level commands during the early phase of the war, there was

no formal command echelon between the fronts and the Stavka. When the need for such a command presence was indicated, Stalin relied on a small circle of trusted officers to provide it. These individuals were dispatched to critical sectors with or without supporting staffs and with ill-defined but implicitly broad powers.

Chief among the men used by Stalin as his representatives were Marshals Zhukov, Vasilevskiy, and Voronov, and General Antonov. After the removal of the aging and ineffective 'First Cavalry' marshals who had served with Stalin during the Civil War -- Voroshilov, Eudeney, Kulik, and Timoshenko -- these younger men took their places as Stalin's personal military advisers. They had all been majors and colonels in 1937. Each was to divide his time between some position of high authority in the strategic organizations and serving as Stalin's representative in the field.

Marshal Zhukov was a very special case. He had demonstrated his ability in battle as a division commander fighting the Japanese in 1939. His military talent plus his service in the First Cavalry Army insured his rapid advancement. At the start of the war he had already become Chief of the General Staff. As the situation deteriorated in the second week of the war, Stalin sent Zhukov to command the Reserve Front in the Smolensk area. There he was responsible for a successful Soviet counteroffensive in the

El'nia salient (August 1941). Henceforth Zhukov became Stalin's personal representative to which ever sector was the most critical. He supervised the key defensive battles before the cities of Leningrad, Moscow, and Stalingrad. In the later phase of the war, he was sent to oversee all of the major offensives. From August 1942 he was appointed First Deputy Supreme Commander in Chief -- second only to Stalin [Ref. 47: p. 343].

Marshal Vasilevskiy, who was Chief of Operations until June 1942 when he became Chief of Staff, was also used extensively in the field to personally supervise and coordinate fronts and armies. Morozov noted [Ref. 66: p. 46] that he often worked jointly with Zhukov, being sent to the field as representatives of the Stavka some fifteen times. Unfortunately, his absence had an undesirable effect in Moscow [Ref. 9: p. 58]:

On the instructions of the Supreme Commander, Vasilevskiy had to spend a great part of his time at the fronts and in his absence the General Staff was left in the charge of Commissar F.Y. Bokov, a wonderful person and a good party worker, but not trained for purely operational functions.

The actual functions and powers of the representatives of the Stavka varied. Some of them were used as general area "supervisors," like Zhukov only with more restricted authority. Marshal Meretskov served this function in the northern sector, for example. Some of the

representatives had service or branch related functions, like Marshal Voronov for artillery. According to Morozov [Ref. 66: p. 43] they had no set complement of support or staff personnel, but assembled what they felt necessary:

The Hq SHC [Stavka] representatives had assigned to them operational groups which functioned as their working apparatus. They consisted of members of the General Staff, the staffs of commanders of the arms and services, the chief of Rear Services, and other central organs of command and control.

The actual responsibilities and authority of the representatives of the Stavka were never formalized, since the positions were entirely arbitrary. They were not integrated into the force structure until late in 1944, but functioned purely upon the personal authority of Stalin. Shtemenko [Ref. 9: p. 55] and Morozov [Ref. 66: p. 43] agree that the first document describing the duties of a representative was a telegram Stalin sent to Deputy Defense Commissar Mekhlis on 8 May 1942:

... you are not a mere onlooker but the responsible representative of [Stavka], who answers for all the successes and failures of the Front and is duty bound to put right on the spot the mistakes made by the command. You and the command together are responsible...

Writing thirty years later, Marshal Zhukov himself recalled that the representatives [Ref. 66]:

... did not command the front. This function remained in the hands of the commander. But, having been delegated great authority, they could influence the course of

battles in their sector; could correct in a timely manner mistakes made by the front or army commander; and could render them concrete assistance in receiving material-technical resources from the center.

The confused command relationship is not so ambiguous as it might appear. The commander and military councils in the field were well aware that the "representatives of the Stavka" were Stalin's personal emissaries, answering directly to him. Shtemenko briefly mentions, then dismisses, criticism by 'some front commanders' that the continued presence of the representatives at their headquarters 'interfered with their command of the troops.' [Ref. 9: p. 117] Occasionally conflicting orders were issued by the representatives and the General Staff. The representatives invariably won. [Ref. 69]. Part of the resentment could have been mollified by the preferential logistic treatment given to those sectors where representatives were present [Ref. 9: p. 117]. These representatives were successful in getting better support for their sectors for several reasons. First, their presence alone indicated that the sector was considered critical. Second, they had personal access to Stalin, who jealously retained reserves for his own personal allocation. Third, many of the representatives held authoritative positions in their own right by which they could divert resources to their sector.

While the representatives of the Stavka clearly had broad powers, they were not insensitive to their own vulnerabilities. While they were making certain that the instructions of the Stavka were understood clearly and without misinterpretation by the Front commands, they were observed by the officers of the General Staff. Shtemenko recalled the difficulty he experienced getting Marshal Timoshenko to accept him as his 'assistant' during the Baltic campaign late in 1944 [Ref. 9: p. 266]. After Timoshenko came to trust him, he told Shtemenko "I thought you had been set to watch over me specially by Stalin. It was the fact he himself mentioned your name, when the question of a chief of staff was raised..."

In addition to the representatives sent out to exercise general command supervision, there were also specialized representatives. Morozov offered a partial listing [Ref. 66: p. 42]. These men were strictly concerned with special branches or services, whether combat arms or support. Commanders and other ranking officers from the different directorates were dispatched to personally observe the combat effectiveness of their doctrine and equipment, and to marshal their specific resources for large operations. Marshal Voronov, Commander of Red Army Artillery, described [Ref. 66] how he was sent out by Stalin to Stalingrad in order to develop the concepts for employment of artillery in the battle:

We were also very concerned with questions of organizing coordination of artillery fires with infantry, tanks, cavalry and aviation. The success of the operation would depend to a great degree on the precision of coordination. We also worried about questions of command and control. How should we create the offensive groupments, particularly artillery, and how should they be controlled?

Officers of the specialized services and directorates who were sent into the field as Stavka representatives had great operational and doctrinal powers within their specialties. Combat experience could immediately be used to develop new tactics, doctrine, and equipment modifications.

The use of "representatives of the Stavka" was probably a very effective means for Stalin to keep tight, centralized control over operations in the field while at the same time allowing many critical decisions to be made on the spot. Given the uneven competence of many of the front and army commanders, he was able to use the same few trusted and talented leaders wherever the situation was most critical. Towards the end of the war, the representatives were no longer used as such but were formally integrated into the force structure. This started to develop in mid-1944. Morozov [Ref. 66] attributes this to the shortening of the strategic front, which allowed the Stavka to control all of the Fronts directly.

b. High Commands

Simultaneously with the creation of the Stavka of the Supreme High Command in July 1941, three subordinate High Commands (GK) were created to oversee and control groupings of fronts, fleets, and flotillas. These were the Northwestern, Western, and Southwestern, and were commanded initially by Marshals Voroshilov, Timoshenko, and Budenney respectively. These were established because the Stavka and the General Staff could not maintain continuous communications with, or control over, the fronts directly. Lines of communication proved too long and too easily disrupted.

The difficulties faced by the commanders and staffs of the High Commands were not limited to shortages of personnel and equipment, which in themselves were significant enough to prevent efficient operation. As Pokrovskiy described [Ref. 69], the decisions and orders of the High Commanders were not accepted by the Stavka; composition of subordinate fronts, their operations, and even their command elements continued to be dictated from Moscow.

Clearly, the High Commands for 'strategic axes' within a theater had not worked. [Ref. 9: p. 41]:

They had turned out to be superfluous intermediate stages between the GHQ and the fronts. Since they had no proper staffs, means of communication, or control of

reserves, these High Commands could not exercise any real influence on the course and outcome of operations.

The High Commands were individually abolished by September 1941, reappeared sporadically, then were discarded completely by mid 1942. Vyrordov [Ref. 19: p. 21] attributes the failure to their hasty implementation and the lack of skilled cadres to staff them. The Stavka was reluctant to delegate the authority it had originally intended:

The High Commands did not have sufficiently broad authority to make decisions on employing personnel and weapons of axes or to direct troop combat activities, since the Hq SHC usually reserved last word on these matters...[they] were used chiefly to collect and generalize situational information at the fronts of their axes and to report it to the Hq SHC.

The representatives of the Stavka assumed the functions intended for the High Commands. These representatives came to travel with a rather large staff of their own, as indicated by Batov [Ref. 70]: "...the operations group of the Supreme Headquarter's representative [Zhukov] settled down in the area of the 65th Army's command post. We provided them with twenty-nine of our dugout shelters." It seems that the concept of High Commands was not completely rejected, but was simply implemented in a less structured and more flexible form.

The role of representative of the Stavka came to include operational control of groups of fronts. In 1944, for example, Zhukov coordinated the 1st and 2nd Baltic

Fronts, Vasilevskiy coordinated the 1st and 2nd Belorussian Fronts, and Timoshenko did the same for the 2nd and 3rd Ukrainian Fronts. [Ref. 19]. The functions of Zhukov and Vasilevskiy evolved very gradually into true and titular command of groups of fronts, although their other positions -- Deputy Supreme Commander and Chief of the General Staff, respectively -- clouded the exact source of their authority.

A distinction must be made between the High Commands that existed sporadically for control of strategic axes and the High Command created for the Manchurian campaign, 1 August - 1 October 1945. While nominally fulfilling like functions, the Far Eastern Command was substantially more developed than its short-lived predecessors. It was carefully organized well in advance of use, and included comprehensive staffs and directorates provided for that express purpose from the General Staff. It was "relatively autonomous" while being continuously monitored by the Stavka [Ref. 19: p. 22].

c. Adaptable Combined Arms Echelons

As the war progressed, a great many organizational changes were made within the force structure, specifically in the composition and disposition of the larger elements -- armies and above. These constant shufflings were directed by Stalin for various reasons, only some of which were operational.

For the majority of the war years, the fronts were controlled directly by the Stavka with no formal intermediate echelon. Initially there were five fronts in the west, but these soon proved to be unmanageably large given the limited communications capabilities of the Red Army in 1941. By December, these had been broken up into eight fronts. In December 1944 the number of active fronts in the west reached a peak of thirteen [Ref. 71: p. 46].

The front was an extremely flexible organizational concept which varied tremendously in size and combat power. The smallest fronts commanded three or four armies, comprising twelve or so divisions in total. Typical of these were the 4th Ukrainian in 1944 or the Volkhov in 1943. The largest fronts contained up to ten or more armies, consisting of as many as 55 divisions. The 1st Belorussian and 1st Ukrainian Fronts reached this size in 1945. In 1944 the 1st Ukrainian had swollen to include 74 divisions, including 13 armies [Ref. 72: pp. 161-179]. The size of the front was directly related to Stalin's estimation of the capabilities of its command element -- the commander and his military council.

Stalin moved his front commanders about, from one command to another, to insure that the best commanders were present in the most critical sectors. [Ref. 73: Appendix C]. Front commanders like Konev, Rokossovskiy, or

Zhukov himself would displace lesser lights and those fronts would grow dramatically.

Fronts also shrank in strength as their sectors became quieter or as the front commander began to lose favor. Sandalov [Ref. 74] described the liquidation of the Bryansk Front in the fall of 1943, most of its armies being transferred to the neighboring Central Front under Rokossovskiy. The command group of the front and one army were moved some 500 kilometers north, there to draw several armies from the neighboring Northwestern Front to become the Baltic Front. Three months later, the Northwestern Front did the converse -- it was liquidated, and its command and staff element sent to establish a new front (2nd Belorussian) being created exactly where the old Bryansk had been located. It even took command of those same troops which had been given to the Central Front (by now, renamed the 1st Belorussian). Sandalov and others witnessing the rotation could not determine the utility of it.

Fronts were also established for political purposes, usually relating to the national boundaries which had existed before the war. Thus, Stalin thought it "advisable" to have a separate front for each of the Baltic Republics in the summer of 1944 [Ref. 74].

Just as Stalin continually rearranged the number, size, and command elements of the fronts to achieve what he felt would be an optimum mix, so did his

representatives exercise a similar freedom with the composition of armies attached to the fronts.

One of the early efforts to reduce span of control with combined- arms units was the elimination of the corps echelon on 15 July 1941. The previously existing armies of 9 - 15 divisions had proven unmanageable for their commanders, so they were reduced in size to 5 or 6 divisions. The divisions were then controlled directly by the army, without any intermediate echelon [Ref. 75]:

This measure, which was absolutely correct for that period, permitted making army formations more controlled, using personnel and communications facilities of corps administrations for forming the headquarters of new combined- arms army and divisional headquarters.

Not unexpectedly, command relationships which changed so frequently caused conflict over command authority. When the corps formation returned to active use, it was often not treated as a permanent entity by the army commanders. They tended to override the corps commander and control the activities of the division directly. Stalin was obliged to issue a special order in May 1943 to delineate for the commanders in the army- corps- division chain precisely what the scope of their authority would be [Ref. 76]:

Frequently army commanders, in spite of having corps commanders available, strive personally to direct the actions of the division and brigades making up the

corps, essentially dismissing the corps commander from planning the battle and controlling his combined units in it.

After the initial period of the war in which commanders who failed were executed, the Soviets began to recycle commanders who had done poorly. They were simply reduced in grade one or two steps and given a new command commensurate with the new rank. Several individuals experienced several rounds of this cycle. Army General Petrov, for example, seems to have held the rank of Colonel General on three separate occasions [Ref. 47: n. 66, p. 624]. Marshal Kulik suffered a similar fate. This approach seems to be a rational one, especially when experienced commanders for all of the levels were in short supply.

4. Centralization

In addition to ideological and practical political reasons for strictly centralizing control, there were other advantages for the Soviet leadership in doing so. Especially during the early phases of the war, centralization compensated for lack of experienced commanders at all field echelons. It also compensated for a shortage of all kinds of weapons systems, allowing the strategic leadership to optimize placement of offensive and defensive assets. In achieving this centralization, which was loosened considerably by war's end, composition of forces and organizational diversity were changed frequently.

The Soviet Infantry Division, for example, was substantially reorganized six times in 1941 - 1942 alone.

a. Inexperienced commanders

Strict centralization of all possible planning functions and of many operational functions as well served to extract the maximum use of the relatively small numbers of experienced and proficient commanders and staff officers. The incredible losses of the first three months of the war required huge reserve armies to be raised in extremely short periods of time. In the threatened cities, regiments were raised and marched to the battle lines with practically no training, often with no staffs and commanded by reservists with scanty military talent. The situation was somewhat better in the formally structured reserve armies which were raised in the interior. Marshal Golikov, himself a military intelligence officer, described the situation in the newly forming 10th Army, when he was placed in command [Ref. 77]:

Almost all the regimental commanders were just recently promoted. Only isolated individuals had been graduated from military academies. The majority had merely completed an ordinary advanced training school for officers. Unfortunately, many of them were simply lacking in education.

Great numbers of conscripts and reserves were assembled and formations created in the shortest possible time. Golikov's 10th Army was created literally from scratch and committed to battle in less than one month. His

division commanders and his staff had barely had time to learn their jobs and had not coordinated any working procedures nor exercised their battle functions prior to deployment. During this period (November 1941) nine such armies were created [Ref. 47: p. 594].

With the inexperience and lack of formal military training, elevation of planning and operational functions was a practical necessity. As the war progressed, the General Staff was able to withdraw from current tactical and operational matters and devote more of its efforts to developing long term plans. Zhukov mentions that by the end of 1943, the field commanders were becoming more self-sufficient in directing operations, and the officers of the General Staff were reduced in number and withdrawn from the division level almost entirely. This reflects practical experience gained during the war and the increased trust in the field commanders, as well as the more favorable strategic situation.

b. Reserves and Functionally Homogeneous Formations

The average strength of a Soviet division fell from the pre-war level of 10,000 - 12,000 men to an average of 6,000 during the summer of 1941. The decision was made to retain a small division, and to strip it of the various specialized weapons systems and technical support personnel. Elements such as the light tank, engineer, and anti-aircraft battalions were withdrawn from the division, and

rifle regiments and battalions also lost most of their organic signal and engineer elements. The Soviet rifle division came to consist of very little more than rifles, machineguns, and a few heavier weapons. This accomplished two things for the Soviets. First, each commander below the army level usually had only a few different weapons types under his control -- only one type if it was a larger weapons system. Second, the bulk of the special weapons and technical support materiel and the trained technical personnel required to operate them were placed in larger and more functionally homogeneous reserves [Ref. 72: p. 88].

Limiting the organic weapons of the rifle division greatly simplified its internal command and control requirements. The small amount of artillery which was retained in the division was used exclusively in direct fire, and hence required no complex target acquisition capabilities. There were no rear echelon support elements of any size, the 'non-combatant' share of the division manpower being on the order of four percent [Ref. 72: p. 89]. It was thus a very simplified organization which could be effectively commanded by an officer with little combined-arms experience. When additional capabilities were needed, they were provided by specialized elements whose activities were orchestrated by the army commander and his staff. [Ref. 41: p. 173].

Even at the army echelon, it was difficult to manage diverse force elements. Bokov noted [Ref. 78]

The commanders had shown themselves to be unable to efficiently control the forces of an army and to organize continuous interaction between units with different degrees of mobility and maneuverability.

Because of the losses in the mechanized and tank corps, these organizations were dissolved and independent tank brigades and battalions established from the remnants. [Ref. 17: p. 161]. These smaller formations were used purely for support of the infantry, and were spread so that no front was completely bare of armor. [Ref. 71: p. 47]. Aviation was treated the same way, each front and army being allocated a tiny share of the scarce air assets. Tanks and aircraft were so limited in number that their distribution in this way barely provided more than token combat support during the retrograde maneuvers of 1941 - 42.

Artillery and engineer elements were treated differently than the armor and air assets, because they were at least adequate in numbers. Sokolovskiy stated [Ref. 17: p. 161]:

It was decided to form artillery reserves of the Supreme Command, using artillery from the dissolved infantry corps and at the expense of temporarily weakening artillery in the infantry divisions; these reserves could be used to strengthen the most important directions or sectors of the front.

The Soviet Union was unique in its use of extremely large single arm formations [Ref. 47: n. 115, p. 611]. Some of these, like the artillery, were created from the very beginning of the war, while others, like tactical air, were not created until industry reached full production after evacuation from the west. Large single weapon formations included independent tank, artillery, and air corps, mortar and anti-tank regiments, and anti-aircraft regiments and divisions [Ref. 71: p. 47]. During the period when fortified zones were being constructed (until 1942), there were ten engineer armies reporting directly to the Stavka. These large units containing the bulk of the entire Red Army's resources could then be employed in mass in the most critical sectors. As Marshal Kulikov noted [Ref. 71: p. 52]:

The principal means by which the Supreme High Command and the General Staff actively influenced the development of operations and the overall progress of the war consisted of strategic reserves.

These reserves even came to include entire fronts, such as the Reserve Front in 1941, the Steppe Front in 1943, and the 4th Ukrainian and Karelian Fronts in 1944.

The large single weapon formations remained the private resources of the Stavka. They were given to the fronts for the period of critical action, whether offensive or defensive, then withdrawn again to the reserve. At the

beginning of the counteroffensive in front of Moscow in December 1941, for example, there were three fronts actively participating in the operation. The critical sector was held by the Western Front and was allocated 618 tanks. The Kalinin and Southwestern Fronts, flanking the Western, had only 60 tanks between them [Ref. 47: n. 73, p. 595].

Shtemenko mentions [Ref. 9: p. 89] the reinforcement of the 56th Army with "Guards mortars taken from passive sectors of the front."

Allocation of permanent reinforcing formations was also controlled centrally, by Stalin himself. Voronov [Ref. 51], Bokov [Ref. 78] and others confirm that Stalin kept as a closely guarded secret the quantity of equipment, ammunition, and replacement formations available in the Stavka reserves. His chiefs of war production would report to him personally on the accumulation of stocks or creation of formations. Bokov and Shtemenko mention a small notebook Stalin kept, which was the 'resupply data base' of the Red Army. Bialer wrote [Ref. 47: n. 116, p. 611]:

At that time [August 1941] almost every piece of equipment and every round of ammunition at Moscow's disposal could be issued to field units only on Stalin's signature. It seems that this procedure persisted even after the crucial shortages of 1941 and 1942 were overcome (although with less attention to minute details).

c. Dual Subordination

With the separation of the specialty arms from the normal organization of the armies and fronts, a system of dual subordination was created by which these homogeneous formations could be controlled. Within the Defense Commissariat, which was otherwise a non-operational management body for war production and doctrine, were formed a number of Directorates and Main Directorates with cognizance over the specialty formations [Ref. 55: p. 9]:

New positions, commanders of service arms, were introduced: airborne, mortar, air defense, and engineer, and the corresponding military control agencies were created under them.

When the specialized formations in the Stavka reserve were allocated to a front, they were subordinate to the front commander in all ways not pertaining to the technical execution of their specialty. Conflicts over the employment of mortars, for example, could be appealed to the Stavka via the directorate, rather than via the operational chain of command through the General Staff.

Rear services for the Red Army were provided at the front and army level by a separate support organization with its own headquarters well to the rear of the zone. The Chief of the Front Rear (!) was a deputy of the Front Commander and "...simultaneously subordinate to the Chief of the Red Army Rear. A similar structure was also adopted in

the armies..." [Ref. 79: p. 373]. The Chief of the Red Army Rear held the post of Deputy People's Commissar of Defense. Bialer noted [Ref. 47: n. 41, p. 600] that after the abolition of the commissars, one of the main duties of the 'member of the military council' was supervision of the rear. Khrushchev, Bulganin, and Brezhnev held such posts during the war.

d. Subordination of the Air Force

Frontal aviation performed functions for the front commander which were quite similar to the way artillery was utilized. They were both subordinated to the front or army commander at the beginning of the war, with aviation assets initially being distributed among the fronts and control of them decentralized. This shortened communications lines and facilitated command and control of air support. As the lines stabilized and communications became more reliable, an increasing proportion of combat aircraft were controlled centrally. This allowed the Stavka to mass the bulk of Soviet air power rather quickly. [Ref. 80]. By the 1943 - 1945 period, from 48 to 63 percent of the fighting strength of tactical aviation was in the Stavka reserve [Ref. 81: p. 16], in air armies and corps.

Each front and army included a certain minimum amount of organic air power -- usually a two regiment division for each front, with thirty planes per regiment [Ref. 47: p. 174]. For large offensive operations which

were supported with additional air power from the Stavka reserve, a Stavka aviation representative would be assigned to the front to coordinate all air assets.

Because of the scarcity of communications equipment, the aviation representative was collocated with the front command post and utilized the common communications center, until 1944. After that time, as Silant'yev reported [Ref. 80: p. 24]:

Subsequently the commander of the VVS [Air Force of the Soviet Army], going out to the fronts as an air representative of the Stavka, had along with him a command post which was small in composition (a group of officer operators, RAT radio, cipher officer, HF communications) which provided him with direct communication with the command of the front, the Stavka, the General Staff, the VVS staff, the air armies, and long range aviation.

These operations groups were freed from many documentary reporting requirements and usually coordinated orally.

When long range aviation (ADD) was used for support of ground operations, it was subordinated to the VVS command. When it operated independently against military-industrial objectives, it was subordinated directly to the Stavka [Ref. 80: p. 24]. Evidently the primary employment of ADD was in ground support, as some 93% of bomber sorties during the war were within 50 kilometers of the front [Ref. 47: n. 42, p. 600].

Commanders of air armies assigned to the fronts were members of the military councils (after 1942) and

deputy front commanders. Subordination was dual -- operationally subordinate to the front commander, but doctrinally, administratively, and functionally subordinate to the VVS chain of command. This ambiguity was especially debilitating when additional Stavka assets had been allocated to the front, as the aviation representative, the air army commander, the front commander, and the overall Stavka representative all had some operational authority. It became necessary to limit the trend to centralization, as reflected in a VVS special directive issued in 1942 [Ref. 80: p. 26]:

The decisive concentration of aviation at the sector of the main effort and, besides for the accomplishment of a limited number of missions... is possible only with centralized control which should not be brought to extremes and become a goal in itself. The tendency of some senior commanders to control the sorties of even separate flights and airplanes, with the complete exclusion of initiative on the part of the lower commander, can in no way be justified. As a result of such 'centralization' subordinates develop inactivity and irresponsibility and air operations are late.

Decentralization of control occurred only during specific types of maneuver, however. Silant'yev [Ref. 80: p. 31] mentions that when aviation units were supporting mechanized and tank units during pursuit operations, the tank army (or corps) commander could assign specific missions to the aircraft. More often, the air commander would himself direct air activity from the headquarters or command post of the supported ground unit. Kozhevnikov noted

During the time of combat operations by mobile groups in the operational depth of an enemy's defense the commanders of aviation units were in especially equipped tanks or vehicles and had radio equipment to control aviation in the air and for communication with their air fields. [Ref. 82: p. 24]

Stationing the aviation commander far forward was evidently necessary to insure effective coordination with the ground unit commanders. It was a measure ordered in January 1944, specifically to avoid loss of joint interaction between ground and air. Previously, difficulties had been experienced with identification of friendly troops on the ground, suppression of friendly AAA against friendly air, and with target identification.

Once the quantity of aircraft increased to a level where tight centralized control was no longer a necessity, each front was given a more or less stable allocation of air assets. The Stavka ceased operational maneuvering of reserves in the final year of the war [Ref. 81: p. 19]. The forces which had composed the Stavka reserve were integrated into the air armies of the fronts. At the same time, subordination of the air elements to the ground commander was replaced by a more independent air arm which acted in support of, rather than subordination to, the front commander [Ref. 82: p. 24].

During the first three years of war, the various naval fleets and flotillas had, like the air force, been subordinated to the ground force front commander.

Compounding the difficulty for the navy was the lack of true joint staffing within the General Staff. With the possible exception of the Northern Fleet, which had convoy protection duties, the Soviet navy functioned primarily as an auxiliary of the fronts. Because of this arrangement, naval aviation and naval infantry were primarily used to perform missions on the mainland. The Navy Commissariat had practically no operational control over the missions assigned naval forces. It was not until 31 March 1944 that the navy was substantially freed from this subordination and, by a directive of the Stavka, given missions of a more traditional naval character [Ref. 83].

5. Wartime Communications

The Soviet communications capability, both fixed and mobile, strategic and tactical, continued to improve throughout the war years. The severe shortages of all types of communications equipment for the armies in the field was largely overcome by 1944. New doctrine and technical advances were swiftly developed. Electronic warfare was practiced by both sides, and relatively effective deception measures were used by the Soviets. The unreliable and easily disrupted communications and command post functions which had cost so many lives and so much territory in 1941 were rectified.

a. Strategic Communications

Stalin and the other members of the Stavka used three basic means for communicating with their representatives and with front and army commanders. These were wireline teletype, liaison aviation, and high frequency (scrambled) voice telephone.

The difficulties experienced early in the war have been previously described. The national network of telephone and telegraph communications consisted entirely of overhead wirelines. These were laid out in a radial pattern around various centers, not a network. [Ref. 84: p. 7]

As a result, all wire communications of the nation consisted of a number of autonomous, and as a rule, not interconnected, systems of the republics, krais, oblasts, and rayons... For this reason, users in different oblasts could be connected only through the central long distance telephone exchange in Moscow.

The radial layout for telephone and telegraph was extremely vulnerable. Loss of any one link could sever all communications with a large portion of the country, since there were no alternate routes available and neighboring rayons or oblasts had no direct connections. Interconnecting always was performed at the next higher level common to both ends. All the wire lines were overhead on poles which paralleled the main roads and railways interconnecting the exchanges. Roads and railways were under constant attack by enemy air and artillery, with

repeated destruction of wire lines as a consequence. This practice was changed immediately [Ref. 85: p. 32]:

Another feature of organization of communications in the armies was the construction of new permanent lines bypassing major towns, rail lines, highways, and graded unpaved roads, in order to lessen vulnerability to hostile aircraft, which were attacking these rail lines and roads.

Since front and army headquarters had counted on using the civilian network of communications, they lacked adequate means of communicating with the Stavka and the General Staff. In a directive dated 23 July 1941, Stalin ordered [Ref. 86: p. 63]:

Chief of the Communications Directorate of the Red Army Comrade Peresypkin and the military councils of the fronts are to provide for equipping the headquarters of fronts and armies with Baudot apparatuses [i.e., teletypes] within a 5-day period by stripping apparatuses from areas in the vicinity of the fronts and also by using equipment delivered from industry.

Stalin relied heavily on teletype for his frequent conversations with front and army commanders. He did not feel that these communications could be intercepted by the Germans, apparently because they were all by wire line. He insisted that Baudot be used and forbade the use of Morse code in transmitting his own telegrams [Ref. 86: p. 65]. "Thus, in the first months of the war, the basic means of communication of the Headquarters of the Supreme High Command was telegraph by Baudot."

Throughout the war years the Stavka and the General Staff relied heavily on liaison aviation for communicating with fronts and armies. At first a squadron was dedicated to this purpose, but soon proved to be insufficient for the need. An entire air liaison division was established and subordinated to the Main Communications Directorate of the Red Army. It carried couriers with operational documents, representatives of the Stavka, and officers of the General Staff to the front and army command posts.

During the war a special governmental - military telephone network was extended into the field to serve the major fronts, and occasionally to army level. Referred to as the 'High Frequency Telephone,' or VCh (Vysoko chastotnyi), this system enabled Stalin to conduct secure communications with his key commanders and representatives [Ref. 86: p. 65]. The VCh was serviced and operated by special detachments of NKVD signal troops. It was evidently a cable system, but was rapidly deployed with the forces even beyond the borders of the Soviet Union [Ref. 47: n. 52, p. 621]. Zhukov, Konev, and Shtemenko all mention it as the means by which they spoke to Stalin personally from the battlefield. [Ref. 87: p. 526]. A technical description of the VCh is not available, but it probably resembled the frequency inversion and scrambling system used for secrecy in contemporary transoceanic radiotelephony [Ref. 88].

In addition to the three basic means used by the Stavka for communication, the General Staff also used radio when available. It was not uniformly supplied at first, some fronts and armies having no sets. In the period 1941 - 1942, some HF voice radio was used for front- to- General Staff communications. After this period, when vehicle mounted radio teletype equipment came into the field, it was used instead of voice [Ref. 86: p. 66].

During the war in Eastern Europe, relay stations were established on the border of the Soviet Union to permit direct radio contact from Moscow down to the army level. Similar relay stations were required for contact with the Far Eastern High Command and its subordinate fronts in 1945.

The communications center serving the General Staff was located with its underground element in the Kirovskaya Subway Station. It was connected via teletype and ring- down telephone to Stalin's office in the Kremlin. A second communications center served the Defense Commissariat, directorates, and the rear services administration.

A vehicular mounted communications center and a specially equipped command train were later assembled for contingency purposes. This train was used by Stalin during the Teheran conference. Shtemenko mentioned [Ref. 9: p. 187] that the train had to be stopped three times a day to

receive reports over the VCh. The train was also equipped with conventional radio and telephone equipment.

b. Civilian- Military Integration

The most striking characteristic of Soviet military communications during World War II was the extent to which it was integrated with the "civil" resources of the USSR. Control over all state and Red Army communications was exercised by one individual -- Marshal of Signal Troops Peresypkin. At the start of the war, three separate organizations had existed with distinct authority and responsibility. These were the Directorate for Communications of the Red Army, the Communications Department of the Operational Directorate of the General Staff, and the USSR People's Commissariat for Communications. Just one month into the war -- on 23 July 1941 -- they were combined into a single agency under common management. The army entities were merged into a single Main Directorate (GUSKA) and its functions blended with those of the Commissariat. [Ref. 84: p. 32].

In order to maximize the use of the existing communications infrastructure for the benefit of the field forces, the Central Administration of Field Communications was established within the Commissariat for Communications. Each army and front staff received a field communications inspectorate (army) or directorate (front), which was simultaneously subordinate to the field commander and to the

central administration. These entities were designed to integrate military needs in the field with existing state communications facilities located in the operational areas. The chiefs of these elements were also deputy chiefs of communications for the front or army [Ref. 84: p. 16]:

In operational terms, the military operations centers were under the respective chief of communications of the fronts and armies through the field communications directorates and inspectorates, and in administrative terms and for questions of material and technical supply, under the chiefs of the oblast and kray communications administrations.

Military line construction units were created to extend or repair the overhead lines, and special reconstruction battalions were created to follow in the wake of offensives and restore national communications. These were part of the Commissariat but responded to military tasking as well.

[Ref. 86: p. 60].

The extent to which civil networks served tactical purposes is described by Peresypkin [Ref. 85]:

One important feature of organization of wire communications in a defensive operation of the 16th Army, as of other armies, was the extensive employment, alongside T/E [organic] equipment, of stationary civilian communications facilities.

Maximum use was achieved during battles in and around major cities, such as Moscow, Stalingrad, and Kursk. When local facilities were used for tactical (as well as operational) purposes they were connected in a ring circuit, converting

part of the radial layout into a network. This enhanced the survivability of the wire links. [Ref. 62: p. 7]

The entire resources of the country were available to the army at any time. Regular radio transmission stations for "commercial" broadcast applications were also pressed into use for military purposes. During the war these powerful transmitters were used to "strengthen communications centers." [Ref. 86: p. 66]. Other state enterprises which had organic communications means served the army as well. In July 1941 'Group Lukin' was created from three rifle divisions and a mechanized corps, and controlled entirely by railway telephone [Ref. 41: p. 166].

c. Skip Echelon Communications

The radial pattern of communication was preserved by the GUSKA in order to insure centralization, but it was slightly modified in order to increase its survivability. Six weeks after the fronts had been abruptly ordered to supply themselves with teletype equipment, the Stavka directed that "all armies within a 2-day period be equipped with Baudot duplex sets and that the General Staff be in direct contact with all army staffs." [Ref. 84: p. 36]. This was the first time that "skip echelon" communications was employed by the Soviets.

The practice of maintaining simultaneous contact with subordinates two levels down was extremely effective.

In 1943, this architecture became obligatory for all levels of command.

Maramzin indicated [Ref. 89: p. 14] that many army commanders received routine reports from corps, division, and regimental commanders during offensive operations. He lauds Army Commander Batov (65th Army) for maintaining communications "to three and sometimes even to four echelons lower, right down to battalion commander." Batov's approach was contrasted with that of other army commanders who maintained communications only with their corps commander:

Although at first glance this granted the corps commander more initiative, at the same time it led to a certain delay in the employment of army means in the course of the breakthrough, especially of artillery.

The main advantages of skip echelon communications were considered to be the time saved in reporting upwards, especially when requesting support, and the added durability it gave to the command and control structure.

d. Tactical and Operational Communications

The extreme shortages of military communications equipment led the Red Army to devise a variety of non-electronic alternatives during the early days of the war. As the shortages were eliminated, much of the earlier non-technical approach was retained as being well-suited to contemporary combat conditions.

Because of the rapid expansion of the Red Army just prior to the war, and because of the early heavy losses, supplies of communications equipment were simply not available for issue to the forces. Practically all of the related industries were located in the areas of European Russia soon occupied by the Germans, and what had not been captured had been uprooted and evacuated to the east. Thus in, 1941, the supply schedules for forces had to be reduced below the pre-war T/E. Divisions were issued 4 rather than 54 telephone switchboards, 100 rather than 327 field telephones, and 10 or 12 rather than 63 radics [Ref. 84: p. 55]. Supply schedules did not revert to pre-war levels until 1943, when production had been re-established east of the Urals. By 1944, field formations enjoyed their own reserves of communications equipment, generally 10 to 70 percent above T/E.

Perhaps because of the lack of other means, or because of more comprehensive exposition of the details, the most accepted method for delivering the operational plan to subordinates was in person. Portugal'sky noted [Ref. 92] that it was most expedient for the subordinate commanders to travel to the superior headquarters, there to receive combat orders personally as a group from the army commander. This procedure took about six hours (division-army levels). If that was not possible, then the commander would visit his subordinates consecutively, briefing each in turn. This

took about twelve hours, but had an added benefit in that the commander could personally observe the terrain and the preparations in each subordinate unit. Missions were only rarely assigned by telephone or radio, even when they existed and were reliable. This was recognized as being the quickest, requiring a fraction of the time, but not nearly as comprehensive as an in-person briefing. The favored method was to assign missions from the map, then to check the subordinate's map to confirm his understanding of the plan. When time was short, staff officers would be given the operational plans and dispatched by air or vehicle to the subordinate command. "On the whole, delivery of combat missions by staff officers or the so-called liaison agents service (liaison officers) was very widespread." [Ref. 90]

In addition to increased detail, greater security was possible if use of radio and telephone was avoided. The Soviets were acutely aware of the German talents for radio-electronic reconnaissance, and had suffered greatly even in the first World War from lack of radio security. German armies and divisions started the war with organic radio reconnaissance companies and platoons, and conducted effective radio location and exploitation within the first 150 kilometers from the FEBA. [Ref. 91] Alferov described a major tactical maneuver wherein an entire army (3rd Guards Tank) was withdrawn from one

bridgehead and inserted into another in October 1943

[Ref. 92: p. 29]:

Twenty Po-2 aircraft of a separate signal regiment and a mobile facilities company of the army were used for command and control during the march, and liaison officers on motorcycles were used in the corps and brigades. Wire communications were laid only at the [river] crossings by personnel of the army's signal regiment and front engineer units, and by corps personnel in day halt areas and assembly areas. Radio facilities operated only in the warning net and only on receive. All this contributed to stable and secret command and control.

In connection with the withdrawal, a deception operation was conducted to avoid enemy detection of the withdrawal. In addition to mock-ups of tanks and guns, army command posts and radios were left behind at the original bridgehead. The Germans were reported to have continued bombing the abandoned positions for a week thereafter.

The only apparent difficulties with the march occurred because the commandant's service had been decentralized to brigade level, and passage through army and corps phase lines were not maintained due to lack of centralized management.

The Soviet concern for secrecy about forthcoming operations overrode any procedure which threatened to sacrifice security for mere expediency. Silant'yev [Ref. 80: p. 28] noted that measures taken to insure secrecy included limiting the number of persons working out operational plans, transmitting plans only in document form

or face-to-face, and hiding the command post itself. Alferov [Ref. 92: p. 30] added that secrecy is also enhanced by "piecemeal assignment of the mission" -- by the army commander for each phase and by the corps commander for each day of movement. Portugal'sky noted [Ref 146, p 38] "To conceal the concept of the forthcoming operation from the enemy, missions were delivered shortly before the attack (to a division -- two days; to a regiment -- one day)."

C. POSTWAR DEVELOPMENTS

There were substantial improvements made in the force structure and its command and control functions in the postwar years (1945 - 1953). These were primarily associated with the formation of true combined arms divisions, with the mechanization of the Red Army, and with technical advances in electronics and production.

Demands upon the responsiveness, flexibility, and scope of Soviet tactical command and control increased dramatically during this period. The large homogeneous formations began to give way to units which integrated several diverse weapons systems into a permanent organizational entity. In 1944 a rifle division had no armored fighting vehicles at all (but was authorized 610 horse drawn units). [Ref. 72: p. 98]. After the war, the rifle division was given an organic tank and self-propelled artillery regiment. Battalions and even companies were

given greater operational self-sufficiency by routine reinforcement with tanks, mortars, engineer, and chemical elements [Ref. 93]. Mechanization of rifle corps was eight times (in terms of number of vehicles) the wartime level. Golovnin wrote of this period [Ref. 94: p. 8]:

It was now necessary to possess more data on the adversary, on one's own troops, neighboring units, the terrain, and to perform a number of calculations connected with the employment of weapons and combat equipment in larger quantities, greater diversity, and greater combat characteristics... Greater detailing was required in mission briefing... Increased troop mobility and more highly dynamic combat operations greatly increased the difficulty of the work performed by the commander and his staff...

While time available for exercising command and control functions was decreasing, the amount of control required by fully mechanized combined arms combat was increasing. Increasing the size of the command staff was found to be an unacceptable measure, as it made the staffs bulky, unmanageable, and inflexible. The Soviet approach to these problems thus [Ref. 94: p. 9]: "...proceeded primarily in the direction of improving the work methods of commanders and staffs as well as the structure and equipment of control entities."

The mass of operational documentation which had been required during the war was greatly reduced. Lengthy "pre-decision" conferences of the commander with all of his staff members and his subordinate commanders were eliminated.

During the war, each echelon had normally had several days to prepare for an operation. This was reduced to hours due to the increased mobility of mechanized forces. In place of extensive documentation, corps and division command and staff personnel would prepare simple operation orders and timing coordination tables in just a few hours. Then, the staff would disperse to the subordinate echelons to monitor and assist their preparations.

During the transition period, when armored and mechanized divisions were added to the rifle corps, a specialized command and staff element was provided within the corps headquarters to assume direct control over these elements. This was necessary, as Golovnin noted, due to the inexperience of the rifle corps commanders with mechanized and armored forces [Ref. 94: p. 11].

A tremendous increase in the use of radio was experienced in the latter war years, and developments continued in this area after the war. This was due in part to the greater mechanization of the army, which necessitated use of radio, and the greater availability and technical sophistication of the equipment itself. Portable UHF sets with much greater range and with broader frequency selection were deployed. Higher echelon command posts also received more sophisticated equipment [Ref. 94: p. 15]:

Mobile communications centers for combined arms units headquarters, which had not been available in the last

war, were deployed... This equipment was carried onboard motor vehicles, which contained switching, channelizing and communications terminal equipment adapted for rapid deployment and takedown under field conditions. Adoption of this equipment greatly increased the mobility of control facilities and the communications system as a whole.

During this period the activities of the staffs also began to be mechanized, primarily by the introduction of various slide rules and mechanical nomographic devices. Procedures were standardized, which had not been done during the war.

There were certain changes in the organizational structure of the Defense Commissariat after the war which tended to compartmentalize the forces along weapons systems lines. In 1946 a Commander in Chief of Ground Forces was created, with a separate headquarters and his own system of directorates. As Garder noted [Ref. 95: p. 132]:

The commander-in-chief of ground forces controlled only the infantry, [horse] cavalry, sappers, signals and chemical troops. Henceforth artillery, tanks, anti-aircraft defense and airborne troops each came under its own General Directorate and its own commander who was directly responsible to the minister.

The tactical air force, long range aviation, and the navy each were headed by separate commanders-in-chief, also reporting directly to the minister.

The territorial organization of the USSR into military districts (Okrugs) was retained, and the occupation troops in Eastern Europe were organized into analogous groups.

These districts and groups, 23 in number, all reported directly to the minister, except for the three Far Eastern districts which were gathered under the High Command of Marshal Malinovskiy.

It can be speculated that the formation of specialized commands was in part an effort to prevent the growth of cliques within the military. The postwar years saw a reimposition of police and political control in the forces, motivated perhaps by the exposure of the troops to Western culture and by the large number of deserters experienced by the army in Europe. Dissatisfaction was high, even with ranking officers. Most of the military elite were given actual or de facto demotions after the war, to prevent a military grab for power. [Ref. 95: p. 128]. Zhukov, for example, became an Okrug commander - hardly commensurate with his wartime position as Deputy Supreme Commander.

IV. SOVIET COMMAND AND CONTROL TODAY

The Soviets view the manifold problems confronting effective command and control on the modern battlefield as posing such new and untried questions that the past two decades are seen as a period of revolution in military affairs -- one every bit as significant as the previous revolutions occurring in the 1940s with the advent of nuclear weapons and in the 1950s with the development of guided missile delivery means. The new revolution is one involving advanced communications technology, cybernetics, and computers to accomplish a new dimension in scientific leadership and management of the armed forces. This third revolution was in fact driven by the consequences of the first two, and is made possible only by the scientific and technological advances in electronics and the social sciences. As Halloway notes, [Ref. 1: p. 27]:

From the political point of view both troop control and military management are different aspects of the general problem of managing social processes. In cybernetic terms, troop control systems and military management systems may be seen as hierarchical decision making systems, through which particular kinds of human activity are optimized.

The approach to command and control taken by the Soviets is quite different from that taken by the West, due in large part to the ideological and political traditions which

dominate military thought and also by the geopolitical relationship enjoyed by the USSR regarding its European client states and its other spheres of interest.

In the past decade the USSR has increasingly turned its attention to developing power projection capabilities which give it, for the first time, the ability to contemplate substantial military involvement in areas distant from its own borders. At the same time, a perception has arisen that theater nuclear warfare, especially if concluded rapidly and successfully, need not inevitably lead to strategic nuclear warfare. The possibility of conducting intense and rapid conventional operations on a huge scale, pre-empting enemy use of tactical nuclear weapons, has also been acknowledged. Success of these operations is made possible only when command and control systems have achieved a new order of efficiency, speed, and accuracy. Current Soviet literature is pre-occupied with the development of these attributes in their command and control doctrine.

The extremely tight centralization of control used by the Soviets is a consequence of their ideology, as is the insistence upon absolute obedience to all orders. Under conditions of modern warfare, when it is likely that nuclear weapons will be used on the battlefield, the highly centralized control system of the Soviets will be extremely vulnerable. The Soviets are not blind to these vulnerabilities, and have espoused certain measures to

insure continuity of control. The first of these measures is to do everything possible to insure continuity of communications between all elements through redundancy, mobility, hardening, camouflage, and technical sophistication.

Another measure used to reduce vulnerability is to plan for every possible contingency, so that no turn of events will confront the commander with a situation for which he does not already have a general solution. To reduce the combinations of possible events, operations are precisely planned and all movements and activities on the battlefield carefully orchestrated in advance. Great precision is required, but pre-planning greatly reduces the communications requirements imposed on the commander. According to doctrine, the offense is pursued by each individual maneuver element in accordance with a precise time-table, adherence to which is of paramount importance.

Soviets expect subordinate commanders to adhere rigidly to the plan of the superior whenever lines of control are cut, and to use whatever means possible to complete the original mission exactly as specified. The subordinates must not deviate in execution of the mission beyond the scope of the original plan. Considering the expected inability of the higher headquarters to communicate to advanced elements to warn of Soviet strikes at targets of opportunity, the superior must know exactly where each

subordinate element is supposed to be at any given instant. The lack of real time information can, to some degree, be compensated for by rigidly adhering to a precise operational time-table.

Since World War II there has been an order of magnitude increase in the quantity of information flowing to the commander, and a reciprocal decrease in the amount of time available to him for processing and decision. Part of this is due to the complete mechanization of the army, which enables the maneuvering elements to move much more rapidly than in previous wars. The availability of nuclear weapons also adds immeasurably to the commander's burden. Nuclear weapons -- even so-called low yield ones of a tactical nature -- are not to be used indiscriminately like some large scale artillery round. The incredible reduction in the number of rounds one needs to expend in order to insure destruction of a given target is paid for by the corresponding increase in the data which must be delivered to the commander before he can make the decision to employ nuclear weapons. This drives the need for a target acquisition data base, force effectiveness calculations, warhead selection, weapons allocation, and effects prediction. For these and other needs, the Soviets are turning to the battlefield computer.

The turn to cybernetics is a profound and heavy commitment for the Soviets, serving first to automate the

highly complex functions associated with advanced weapons technology -- guidance systems, automatic pilots, etc. -- and eventually to automate troop control itself. They picture this as complete automation, and view the commander as a part of the machine, so intimately will their functions be joined.

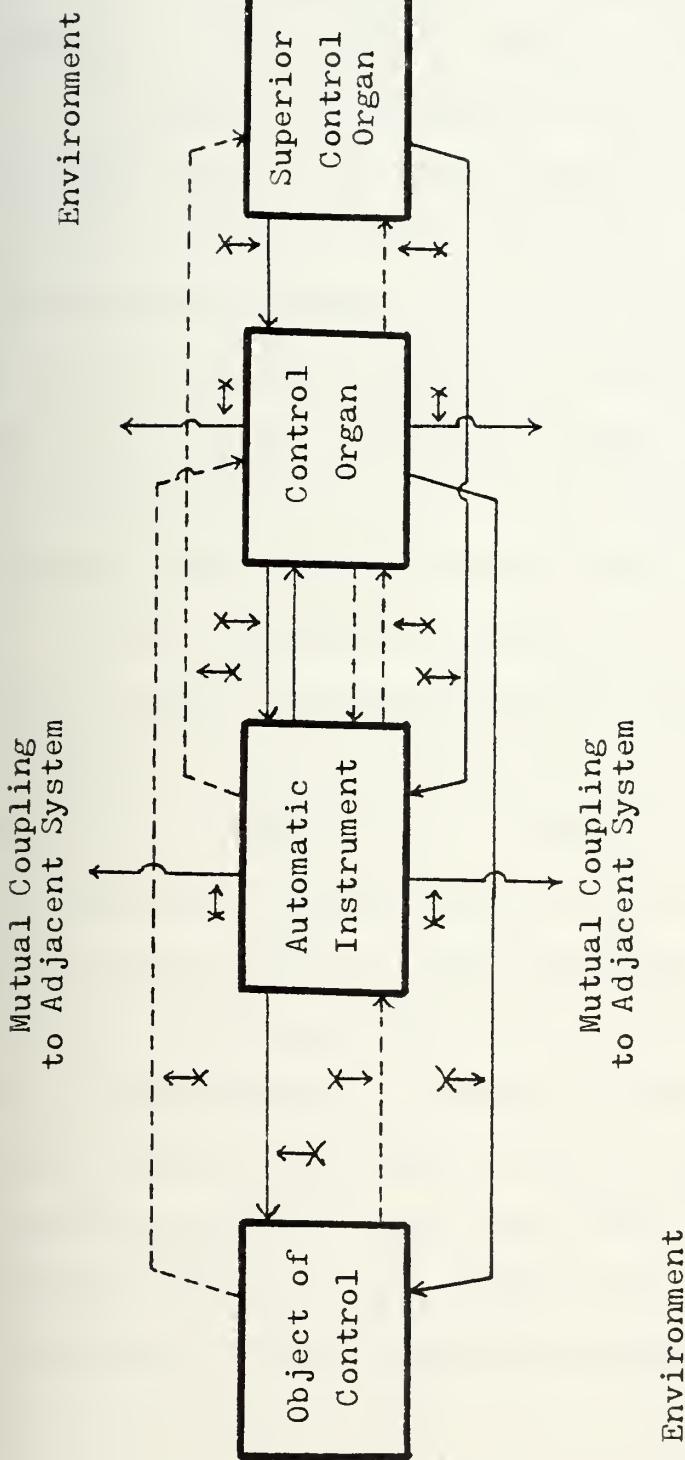
A. THE THEORETICAL MODEL

Soviet military theorists must always start from general principles, which are couched in the dialectic of Leninism, and then work to the specific. In studying command and control, it is useful to examine the model used by Ivanov et al [Ref. 10: p. 12] to typify a military control system. This is shown in Figure 1. The model is the ideal, and the actual command and control system must approximate the model as closely as possible.

1. The Control System Model

As can be seen in Figure 1, there are four entities in the model: the object of the control system, or the controlled object itself; the control organ or agent; a superior control organ or agent; and an automatic instrument for control. The entire model is embedded in its environment, which influences each of the entities in a special way.

The entities are in communication with each other in two distinct modes. From higher to lower entities there are



Symbols

- Direct Communication Channel
- Feedback Channel
- ↔ Interference

Figure 1
The Control System Model
Ref. 10

direct communications channels carrying orders and directives. From the lower elements to the higher there are direct and indirect feedback channels. The communications channels are degraded to varying degrees by interference.

Outside the immediate control system are other, parallel systems, to which lateral two-way communications channels connect. Soviet theorists aim to improve the efficiency and reliability of the control system as a whole by developing and improving upon the individual component parts as well as the entire system. That is, each entity must function in a certain way in order to optimize the system. Each interaction must be optimized, and so forth.

The operation of the model consists of well defined steps. First, the commander or controlling agent gathers information. Second, a decision is made. Third, that decision is communicated to the controlled object. Fourth, the controlled object responds with the directed activity. Fifth, the activity of the controlled object is monitored and its performance measured in various ways, and the state of its performance is fed back to the controlling agent. All of these steps taken in total, comprise one cycle of a repetitive process. The final step of this cycle, the feedback information, overlaps the next cycle and contributes to the information gathering process.

2. The Military Hierarchical Model

Extending the scope of the model, Ivanov [Ref.10: pp. 20-21] then describes the hierarchical structure of the military chain of command, which consists of overlapping control systems conforming to the model. The controlled object is, in every case, matched to the capabilities of the controlling agent. The communications channels applicable at each level are different, but perform the same functions. At the lowest level the controlling agent is the soldier, the controlled object is the weapon, and the communications channels are the physical senses and actions of the soldier and the weapon. It is significant that the entire hierarchy of control systems exists for the express purpose of controlling the weapon. In the Soviet view, the chain must not be broken at any point, or control will be lost.

The actual links in the control chain are indicated in Table 1. Higher echelons are after the regimental model, except that military councils exist at front and fleet levels.

With the exception of the very lowest level, the control systems of the hierarchy share the common attributes of controlling men, not weapons, and of playing both a controlled and a controlling role. That is, the controlled object at any level is in turn the controlling agent for the next lower level. Thus a battalion commander and his staff are the subject of control by the regimental commander and

Controlled Object	Controlling Organ/Agent	Means of exercising control:
Weapon	Operator/ Soldier	Manually, mechanically, semi-automatically, or automatically
Squad or Crew	Squad leader or Crew Chief	Auditory, visual, and some technical means
Platoon	Platoon Commander	Audio, visual, radio, and telephone, but no staff
Company	Commander & staff	Functionally organized staff and specialized control sections for reconnaissance and communications
Battalion & attached units in support	Commander, deputies, & HQ	Complex staff and executive bodies, with special communications, reconnaissance, and observation units
Combined arms Regiment with attached units	Commander & headquarters	Combined arms headquarters and functional control subsystems for combat arms, special troops and services; utilizing all technical means. One-man command in effect

Table 1
Links in Hierarchical Control Chain

staff, while simultaneously controlling the commanders and staffs of companies and attached units within another control system.

One interesting feature of the model is the overlap of monitor and communications functions. As shown in Figure 1, the superior control organ has direct links to the automatic device controlled by the subordinate echelon. Thus, it can communicate down two levels simultaneously, as well as monitor both of those levels. A regimental staff would thus control directly the various battalion level staffs while maintaining contact with the companies. Companies can be allowed to monitor communications between the regiment and the battalion, while the regiment can monitor the responses of the companies to the battalion.

It should be noted that until recently, Soviet literature inferred that the higher headquarters always assumes command of an echelon which has lost its control point. Ivanov [Ref. 10: pp. 220-221] indicates that the commander's operations order should detail the succession of command authority in the event of his incapacitation, either to one of his subordinate commanders or to his deputy. The higher echelon can also extend an element down to the lower level for this purpose. Designated successors share in all combat information and have similar communications means.

Thus, the overlapping nature of the control system model lends itself to the continuity of control from above

in the event an echelon is incapacitated, and one hundred percent redundancy is thus provided implicitly in the hierarchy, aside from alternate control units.

3. Measures of Effectiveness

The Soviets assume a holistic approach in measuring the effectiveness of their troop control, believing that the results of the battle are indicative of the quality of that control. As Ivanov wrote [Ref. 10: p. 26]:

The combat troop control is realized not for the sake of control itself, but for the sake of achieving the indicated goal, the performance of the assigned combat mission. By the results of the assigned combat mission, that is, the effectiveness of the utilization of the forces and means of destruction... it is possible and above all necessary to estimate the effectiveness of troop control on the part of any commander or troop control unit. These are the main criteria for evaluation not only of the troop operations but also the activity of the commanders and staffs. It is quite obvious that it is impossible to consider troop control successful if the subordinate units and subunits have not carried out their combat mission...

The emphasis on success is typical, and in this case can be traced to another tenet of the Soviet doctrine, that the basis and essential element of troop control is the commander's decision. Thus the success of the combat mission is the only legitimate measure of effectiveness of the control system.

Other measures can, however, be applied to the control system itself in quantizing or indexing the efficiency of the control agent. Ivanov indicates [Ref. 10:

p. 42] that each echelon and type of unit has a maximum allowable time duration for one cycle of the control process. That is, the time required to gather the necessary information, make a 'substantiated' decision, and disseminate it to the implementing unit, must be as short as possible and can not exceed an absolute value equal to the 'critical control time.' This critical control time will differ among the various combat arms, being smallest for an air defense unit and largest for some rear services units. It is a concept that will be developed below.

In striving to improve the current state of troop control, in order to satisfy what are perceived as existing requirements upon it, the following measures are regarded as essential: further development of troop control theory; improving the organization and structure of the troop control organs (i.e., staffs); introducing new, automated control equipment; and improving the procedures of the commanders and staffs when using the new equipment.

Significant is the relegation of new equipment to third place, while theory ranks first and organization second. In the Soviet manner, theory for employment must precede the development of the hardware. The hardware does not drive theory.

E. OPERATIONAL CHARACTERISTICS

Soviet command and control doctrine and operational characteristics are often not explicitly stated in the literature but must be deduced from tactics and strategy. Thus it is necessary to consider the Soviet view of theater warfare and address command and control within that context. The European theater is the area of most concern to the USSR, being the most likely future battleground between the forces of the Warsaw Pact and those of NATO. The type of battle for which the Soviets are prepared in Europe is then the environment within which their command and control system will be stressed the most and hence, represents the framework for the discussion below.

Soviet tactical and operational doctrine emphasizes the importance of surprise, speed of maneuver, and weapons of mass destruction in deciding the outcome of modern war. As Record noted [Ref. 96: p. 20], "The Group of Soviet Forces in Germany [GSFG] is structured principally for a massive blitzkrieg against Western Europe, regardless of the circumstances attending the outbreak of major hostilities..." "The magnitude, disposition, and structure of the Soviet Army clearly reflect willful preparation for massive, rapid offensive operations at the theater level in Europe." [Ref. 96: p. 33]. Douglass concluded in his analysis [Ref. 97: p. 4] that "The Soviet concept for war against NATO stresses the importance of a preemptive,

massive, in-depth, surprise, nuclear strike in conjunction with an immediate, high speed ground and air exploitation." Absolute priority will be given to the targeting of Western nuclear delivery units.

Massive concentrations of armor and mechanized infantry will assemble in extremely precise order to advance through the areas devastated by nuclear fires before the defense can recover. Once through the lines of defense, the forces will spread out to attack the rear, consolidate holdings, and encircle enemy forces so that they might be destroyed. Their strikes and their attack will be at the very strongest points on the defensive line, in order to achieve maximum attrition of NATO forces with their nuclear fires. Thus the battle is intended to be very short and intense. Vertical envelopment will be used to attack targets deep in the enemy rear. The desired frontal attack will take place only after the defenses have been cleared by nuclear fires, the attack being launched from the march. Units will be time-phased to avoid static concentrations of troops, which would make lucrative targets for NATO fires. All of the attacking elements will adhere rigidly to the operations time-table established by the commander.

Subordinate commanders are expected to use every means at their disposal to meet the superior's objectives to the minute. Failure to move in accordance with the master plan could place the unit in the way of subsequent Soviet fires,

which will be made with the assumption that all friendly units are on schedule. When loss of contact occurs, maneuver elements are expected to execute their missions, but not to change or add new ones.

The thrust of Soviet doctrine and development can be characterized by the following measures:

- (1) Plans for all possible contingencies are prepared in advance, so that subordinate units may have their missions completely mapped out in preparation for "triggering" either upon the command of higher headquarters or upon the occurrence of a predetermined pattern of events.
- (2) The reporting, decision-making, and order disseminating processes are expedited to the greatest extent possible, so that they might occur before a breakdown in communications occurs and before the enemy has time to organize an effective strike against the Soviet force.
- (3) Algorithmic methods and automatic devices are incorporated into all control organizations so that decisions may be made more quickly, may conform more closely to the "optimum", may be made uniformly and predictably, and may be made reliably even in the absence of firm control by higher authority.
- (4) Control points and the communications means which support them are made as survivable as possible, by

hardening, making them mobile, redundant, and as small as possible.

1. Operational Precision

Soviet literature stresses the paramount importance of precision in the execution of the unit mission. The plan for the battle must be precise and unambiguous, and the subordinates must conform to the plan exactly as it is written. The Soviet thoroughness in planning for every possible contingency in the most consuming detail is one of the most striking aspects of their command and control system. As Reznichenko wrote [Ref. 98: p. 16]:

Much depends on the ability of the commander to formulate the battle mission clearly to his subordinates, to determine precisely the order of execution by position and by time, so that the content of these missions permits no variation in interpretation...

The ideal plan is one which addresses all possible variations of events, so that even should total disruption of communications occur, the subordinate is still able to perform according to the plan of the superior. Such a plan is characterized by timetables, precision, and total adherence by the subordinates.

The benefits are several. Radio communications are considerably reduced, since much of the coordinating information has been decided ahead of time. Pre-operational radio traffic is reduced, since the plan is generally

transmitted by written or other hard copy means. Surprise is thus facilitated, although at the cost of real-time control. The precise plans obviate the need for many of the warning signals necessary prior to use of nuclear weapons, as the subordinates are all aware of the expected times of detonation. Since the exact expected location of all friendly forces is known at any time, fires on targets of opportunity are facilitated. Douglass quotes General Pavlovskiy [Ref. 97: p. 81]: "In a combat situation it is important not to be late, but also not to arrive in the indicated region ahead of time."

Among the authors that stress the importance of precision is Gorbatenko [Ref. 99: p. 93]. It is essential that the subordinate units execute the

efficient implementation of the operational plan, with the principal emphasis placed on an accurate observance of the established schedules... a battle, regardless of its scale, must be subordinated to a definite organizational principle. The coordination of operations in term of place, time, and goal is an indispensable condition for successful fulfillment of combat tasks ...

Jacobsen reported that the Soviet operation against Jigjiga, Ethiopia, commanded by First Deputy of Soviet Forces General Petrov, was notable for its "clockwork-like precision" which until that time had not been seen anywhere except "...on paper in staff colleges." [Ref. 100: p. 124]

The vulnerabilities attendant upon this rigid approach to operational planning were identified by Doulass [Ref. 97: p. 88]

This notion of precise timing, preplanning, and adherence to schedules projects the picture of a highly structured, very inflexible operation; and one that would appear very suspect when compared with the environment, which is considered to be one involving extreme destruction and gross uncertainties.

One of the solutions to the control problem will thus be the rigid adherence to the operational plan, which will be detailed enough to be definitive under all possible circumstances in the course of the battle. Such a plan will be massive and difficult to prepare as well as difficult to reference quickly. Thus, the Soviets are stressing the automation of the decision-making process.

2. The Time Factor

Soviet writing about modern command and control repeatedly stresses the critical importance of reducing the amount of time spent on the control cycle. As mentioned above, the duration of the cycle can be used as a measure of the performance of the command and control system. As Lomov declared [Ref. 35: p. 164], "To control proficiently means each time to spend as little time as possible on the control processes in order that the maximum possible time is available to the troops (for execution)." The need for gaining time is symptomatic of the new weapons, the speed of

maneuver (due to the mechanization of the forces), the ability to maneuver by fires alone (due to the mass destructive capabilities of nuclear weapons), the high rate of data flowing into the headquarters to allow it to manage the battle, and other factors which place excessive demands upon the commander and his ability to react decisively and without error. Indeed, the Soviets consistently write of achieving optimum solutions in battle, not merely satisfactory ones.

Technology has compressed the time available for command and control functions to an incredible degree. Technology has also provided the commander with the potential automation of these functions, which is in the Soviet view the only way he will be able to keep pace.

Lomov [Ref. 35] and Ivanov [Ref. 10] assert that given the dynamic nature of the modern battlefield, the command and control process must be assessed in a quantitative way. Lomov defines critical time as the time elapsed from the gathering of a piece of combat intelligence to the time when it is no longer pertinent. Within that time period, the information must be processed into intelligence; a decision must be made by the commander based upon the intelligence and upon his own combat capabilities, while considering the factors of weather, logistics, morale, etc; the decision must be converted into plans and orders; and the orders must be disseminated down the chain of

command to the troop units which will implement the plan. This period represents T(Control), the time expended upon the control cycle. If T(Action) represents the amount of time available to the troops for the execution of the plan after receipt, the relationship

$$T(\text{Control}) + T(\text{Action}) < T(\text{Critical})$$

must hold if the combat unit is to perform its mission at all. Every minute spent on the control cycle thus reduces by one minute the amount of time available to the combat element. If one assumes that the maneuver elements have been extensively trained for their mission capabilities, and that they will have viable strength, the only way to reduce the total response time is to reduce the time spent on the indirect combat activity which we call command and control.

At the same time that $T(\text{Critical})$ is shrinking due to the realities of the modern battlefield, the amount of data which the commander and his staff must digest is increasing -- three to four fold, according to Bondarenko [Ref. 101] over the volume of similar data required by a commander in World War II. The answer, according to the Soviets, is twofold. First, the functions and procedures used during the control cycle must be refined and developed to the utmost degree of efficiency. Second, as many functions as possible must be automated.

An additional consideration was raised by Andersen, Druzhzhin, and Lozik [Ref. 22: p. 15]. They noted that for a hierarchical command and control system, the total control time is the sum of the control times at each echelon. Thus, efficiency can also be increased by reducing the number of levels which must exercise a given command and control role in the operation. The highly centralized structure of control is not efficient in terms of timely operational control of forces. "The less time air defense has at its disposal, the greater the independence required by lower echelons." [Ref. 22: p. 20]. Thus, two modes of operation are prescribed for air defense forces, depending on the situation:

It is anticipated that, when timely warning is not provided for active air defense assets, autonomous operations will be required not only for fighter interceptor formations and crews but also for individual ADM and ADA units. [Ref. 22: p. 20].

Reznichenko [Ref. 98: p. 16-17] suggested that the shortening of control time could best be achieved by reorganizing the work of the headquarters so that work proceeds in a parallel, rather than serial, fashion. In order to achieve this contraction, work which was previously considered to be 'independent' must now be done in combination with other tasks, permitting "a substantial reduction in the amount of time required for the control

function." A later article developed the theme further:

[Ref. 122: p. 53]:

The blending of such previously independent processes as definition of the assignment, assessment of the situation, adoption and formulation of solutions, allocation of combat assignments, and organization of mutual support represent the second feature of the modern approach to the work of the commander and the staff.

By combining all of these activities into one homogeneous process, the commander -- who now works simultaneously with his assistants -- accomplishes a parallel processing of the combat assignment. Lomov develops the idea further when addressing the need to disseminate the commander's operational goals as soon as they are determined, without waiting for a complete operational plan. Although couched in general terms, the process described corresponds roughly to the fragmentary or warning order used by the US Army. The parts of the Operations Order are disseminated in bits and pieces as they become available. The advantage gained by this procedure is that T(Control) is allowed to overlap T(Action), and hence, allow both the commander and the troops more time.

Ivanov devotes much discussion to the means of accelerating the staff activity involved in the preparation of plans, asserting that time and motion studies are necessary in determining which activities are effective, which must be eliminated, and so forth. It can be assumed

that much analysis has already been done on these functions, as Ivanov offers time lines with precise amounts of time allocated to specific staff sections for the development of operations plans in an expedited manner. [Ref. 12: pp. 116-118]. He develops norms for the various actions which must be performed -- expressed in minutes.

Experience shows that scientific organization of labor is unthinkable without the presence of normative, admissible indexes (sic) for the expenditure of time on performance of an operation.

The norms are the maximum amount of time an individual may take to perform the task -- it is asserted that experienced staffers will greatly exceed the norms.

Ivanov, Evgen'ev [Ref. 103] and others describe the use of PERT charts in accomplishing not only physical work but also in the command and control process itself. In the Soviet view, monitoring and directing staff work in real time is possible through the use of these charts. A prerequisite to PERT application is the formal structuring of each possible task, the assignment of norms to each task, and the identification of the critical path. The commander is to move personnel from task to task in order to avoid delay on the critical path.

Reduction in physical preparation time is essential in the rapid dissemination of warning and alert orders. Ivanov [Ref. 12: p. 126] advocated dissemination by the

simplest means available which yet retain the required degree of accuracy. The officer's working map is the usual means, although both Ivanov and Reznichenko [Ref. 102: p. 52] describe use of tapes for this purpose:

The bringing of assignments to those who carry them out, using magnetic tapes containing all the necessary instructions, including preliminary combat orders which insure similar approaches to organizing a battle at various levels, is widely used. This guarantees a considerable savings in time.

It should be noted that tapes are easily and rapidly created and duplicated, and can be transmitted securely by courier or staff officer.

Icmov considers information theory to hold great potential for significantly decreasing the amount of time spent in communicating. Information must be condensed by removing redundancies and by packing the greatest amount of meaning into the fewest possible symbols, not only to reduce transmission times but also to allow for the transmission of partially digested intelligence. The need for a new military language, governed by its own conventions and tailored to its own requirements, is implied.

Use of graphics, especially the officer's working map, is viewed as an expedient means of communicating. Ivanov indicates [Ref. 10: p. 83] that every staff officer must be equipped not only with his own maps but also with a rather substantial inventory of colored pens, protractors,

and other aids to graphic work. He also builds on Lomov's espousal of forms and formatted messages as a means to eliminate redundancy and speed preparation, transmission, and assimilation. The position of the data may convey as much or more information than the data itself. Consider the familiar 'Call for Fire' used in the US Army. Terse, accurate, and totally non-redundant, it could serve as a model for a possible future 'military' language. The message comes to mean much more than the sum of its parts.

The Soviets stress perfection in training as an absolute imperative in the reduction of control times. Kirov [Ref. 104] describes the necessity to shorten reaction times by drilling on procedures until they are automatic. He distinguishes between two possible uncertainties. In the first, or simple form, an impending action or event is known except for the exact time of its occurrence. In this case the decision maker can review in his mind the steps he must take after the triggering action occurs, and can respond without cognitive process based on reflex alone. The second, or complex form, of uncertainty involves an unknown action or event and an unknown time of occurrence. This type of uncertainty will cause delay, because

Here the soldier can no longer count on a ready action program... elements of confusion are more likely in such situations, and the guarantee of reliable action requires different measures from those employed in the

first version of suddenness (sic). The formation of a specific personality quality which could figuratively be termed familiarization with the unfamiliar is important for insuring emotional-volitional stability in such a situation. The basis of this quality is compounded of a system of knowledge of all the theoretically conceivable situations which, although of slight probability, are, all the same, possible.

In order to prevent time loss, then, the second type of uncertainty must be reduced to a minimum. This can only be done by exhausting the entire range of possibilities in preparation for the battle. Planning for every conceivable contingency will thus, in the Soviet view, reduce reaction time and eliminate the need for cognitive activity during the reaction cycle.

3. Algorithmic Control

The Soviets have written since the 1960's about the need to automate command and control functions. This need, they feel, has arisen due to the introduction of nuclear missile weapons and the mechanization of the forces. Time available to prepare for offensive operations has been reduced, for example, from the several weeks available during World War II to the few hours available under present conditions. Time for making critical decisions while under fire has been reduced to mere minutes.

As Bondarenko wrote [Ref. 121], "A fundamentally new way to resolve the most complex problems of control had to be sought. Such a way was found -- it was full automation of control." The Soviets appear to have embarked on a

massive program to accomplish this automation. In order to achieve automation, command and control activities must first be described in a mathematical way, as must the entire phenomena of combat. From the mathematical model, algorithms must be developed which will present the user with an optimum decision.

Modelling of the combat situation and combat decision making are the critical first steps in the Soviet shift into automation. As described by Babich, Dubovittskiy, and Lavrent'yev [Ref. 125], and also by others, modelling can consist at the most elemental level of the thought process followed by the commander before the battle. This is a purely theoretical model. Formulas which describe the behaviour of the combatants or their weapons can be used to enlarge on this model and make it into a mathematical one. In the Soviet view, there is a model which describes each variant of combat activity, each nuance of tactics. Even without automatic devices, the commander must rely upon the models with which he is already familiar to select the proper course of action in combat. As Babich et al note [Ref. 125: p. 32] in the case of aerial combat: "...the pilot will [not] be performing complex calculations. He should skillfully utilize available reference material in order to select the optimal combat maneuver type and conditions." Thus, the array of models with which the commander is familiar determines the choices he has to call

upon in making his decision. Anashechev noted that before a model could be accepted, it had to be tested physically.

[Ref. 126: p. 9]

It is essential to resort to 'full scale' modelling and to the training of the personnel. In other words, 'to play through' the future situation ahead of time. And not merely to play through, but rather to do this under different situations and with various unannounced changes.

The scientific-technical revolution, as Volkov noted, has made it possible to build quantitative models of troop control and combat activities. [Ref. 127: p. 34]

This has made available new opportunities for conducting a quantitative analysis and comparison of the variants for a decision, for formalizing the conditions of a task, etc. and for expressing its content in the form of numbers, tables, formulae and functional dependencies which could serve as the basis for creating formal models of combat operations. These models are studied with the aid of logical-mathematical methods, which enable one to compare the various variants for a decision and to select the best one.

The description of combat activity in a mathematical way and the application of algorithmic methods to the decision making process is ongoing. The set of rules for working out solutions to basic military situations are formulated in peace time so that they will already be incorporated when war begins. Lomov wrote [Ref. 35] "Mathematicians are at work on algorithms. Before this, military specialists describe in detail both orally and in writing how a commander and his staff act in a similar

situation." The difficulty facing the mathematicians is acknowledged and accepted. It is a necessity if the desired degree of control is to be achieved. Bcdarenko asserted [Ref. 128: p. 220] "Any formalized and algorithmized area of human mental activity can be turned over to a machine." In another work, he noted [Ref. 121] "Full automation of control over troops should be considered in the plan for the feasibility of formulating and establishing algorithms for human intellectual activity."

Once the model has been built and the requisite algorithms developed to use it, it is ready to function in either a manual or an automated mode. Use of the algorithm with any given combat situation will inevitably result in one answer, the 'correct' answer, in the Soviet view.

Soviets have traditionally relied upon specific doctrinal solutions to every possible problem. They use extensive tables and nomograms to determine the quantitative values of many operational parameters. As Weiner noted [Ref. 25: p. 114]:

An excellent example of this is the concept of 'density'. It is computed for all types of fire (artillery, aerial, etc.) as well as for the initial employment of weapons (tanks, antiaircraft guns, etc.), reducing all conceivable circumstances to mathematical formulae. As a result of this rigidity, leadership training courses discourage initiative in problem solving and allow for only one correct solution.

With the view that there is indeed one correct and optimum solution for any given combat situation, and that the algorithm will provide the best answer, the Soviets have thus expanded their scope of positive control. The doctrinally proper solution will be arrived at in every case if the algorithm is used. The commander need only identify which of the previously generated models of possible solutions corresponds most closely to the present situation and respond in accordance with that model. As the range of variations is infinite, it is clear that automation of the model library is necessary. Automation also insures that the algorithm will be applied properly, as it is then a machine function over which the commander has little or no control.

Under certain circumstances the commander using the algorithm may have been involved in its design. Frolov wrote [Ref. 109] "The computer may issue an optimal decision by retrieving an algorithm that was previously written and stored in the machine... a solution that has been previously prepared by the commander under calmer conditions for an analogous case." That the algorithm is more accurate and successful in deriving an operational solution is espoused by Reznichenko [Ref. 122]. In describing the varying degrees of success achieved by students at the Frunze Academy in determining the best solution to a tactical problem, he noted that the solutions

were not all optimum. But, he says, "The automation of control will result in the elimination of these shortcomings."

Soviet writers are careful to retain the man in the loop in writing about future control systems. There is a dichotomy of apprehensions apparent in how the control systems will be used. Numerous articles have appeared in the 1970's addressing the psychological barrier which reliance on automatic systems poses to some commanders. These conservative officers are directed to place more faith in the machines and to accept the accuracy and speed with which they work, far in excess of the capabilities of an individual. Yet at the same time, it is clear that the capabilities of the machines are rather limited and that the users must know the algorithms and the limitations of the programs in order to use them effectively. Frolov [Ref. 109] and Voronin [Ref. 110] both carefully note that the decision produced by the machine must be adapted to the specific circumstances facing the commander at the moment of decision. In this regard, the solutions are more a basis for the commander's solution than a replacement of it.

Kalashnikov asserted that the use of algorithmic methods repeatedly in training had an exceptionally beneficial result on the officers assigned to command posts, even when manual methods were used [Ref. 111: p. 50]:

Training based on the use of combat control algorithms is highly beneficial for officers, especially those assigned to command posts. These are a compilation of rules based on systematizing of certain similar characteristics of typical situations. As they develop automatic actions based on one or another algorithm the commander and the other officers reinforce their skills in using the automatic control system and learn to make decisions based not only upon their own knowledge and computations but also upon the accumulated experience of many years. Training exercises involving algorithms are also beneficial in that as they develop actions identical for many situations to the point of automation they also reduce the amount of time required to make decisions and make it possible to free the mind... this is especially important when time is short, when the commander is forced to make precise and thoroughly substantiated decisions almost instantaneously as the situation changes.

In this regard Kaleshnikov notes that it is imperative before using the algorithms that the commander be familiar with their limitations. This is so because the algorithm will produce a solution, even to a problem with which it is not familiar, by default to the closest previously recorded solution.

In addition to the obvious advantage in speed of operation and increase in scale and accuracy of computations, the use of computers and other automated devices offers a significant advantage in reliability. Ivanov et al noted [Ref. 10: p. 87] that automated information gathering is "more reliable" than manual methods, and thus many reports to higher headquarters would not be required. Of course, computerized systems can report automatically, updating every echelon's data base

simultaneously so long as communications links are functioning. The automated systems can also be relied upon to produce repeatable results, based on the accepted doctrine and the approved tactics. Certain safeguards, such as for weapons control, can be built into programmed operation. In many ways, the use of machinery in control is more positive than the use of humans because the automata are more trustworthy. How much more reliable, predictable, pliant and responsive are machines. Bondarenko and Druzhinin [Ref. 112] look forward to the day when human thought can be synthesized. The human commander will still be required, but his function will be much more of a psychological one rather than an intellectual one.

There is one final benefit from the use of automation in command and control. With their extreme thoroughness in preparation for operations and preplanning all possible actions for the battle, the Soviets seem to be striving for a battle plan so complete, so decisive in all its contingency branches, that a subordinate unit equipped with this plan will have no requirement for referencing the superior commander during the battle. Thus, when communications are cut off, the algorithmic processes may continue unabated so long as the control point itself retains its computers. In this way, positive control over the forces can be effectively retained even when communications are lost. As Bondarenko wrote [Ref. 101]:

Nothing should be allowed to prevent the troops from fulfilling their assigned tasks. Not even a break in coordinated actions or being cut off from a superior officer's control...

In the Soviet view, loss of communications does not mean loss of control so long as the subordinate unit adheres to the operational plan of the superior. This continuity will be provided by automation of command and control.

4. Stability of Control

The Soviets continually stress the importance of maintaining stability of control, by which is meant the continuous, viable functioning of command and control. To accomplish this stability, each part of the control system must be protected against interference or destruction. Vulnerable points must be safeguarded or made redundant in such a way that probability of total loss is low. As Reznichenko wrote [Ref. 102]:

Improving the viability of systems for controlling troops, as well as the reliability and stability of their operation, is the vital issue of our day. The task is not an easy one, if you consider the revealing indication of communications equipment -- electromagnetic emissions, and also the growing ability to neutralize and destroy our points and means of control... As practice has shown, achieving the interchangeability of various control points, the organization of control through the echelon of command, the systematic jamming of the enemy's radio sets, and the dependable protection of control points and communications equipment enhance the possibilities for carrying out this task.

In achieving the goal of stability of control, three distinct kinds of measures are employed. First, control points are preserved. Second, communications are preserved. Third, none of the elements of the control system are indispensable. These measures are discussed below.

a. Survivability of Control Points

In order to insure the survivability of control points, they must be made difficult to detect. If detected, they must be difficult to hit. If hit, they must be difficult to destroy. In an earlier work Reznichenko asserted [Ref. 98: p. 18], "Periodic changes in location, the use of various types of communication, reliable camouflage and defense are very effective in raising the survivability of control points.

The Soviets have always stressed the importance of good camouflage and deception, especially of control points. Current doctrine calls for establishing dummy command posts as well as hiding the actual one. Combat engineers are provided to control elements for that purpose [Ref. 10: p. 97]. The electronic signature of control points will also be disguised, both by placement of high power emitters at dummy locations, and by the utmost control of radiation from the actual control point. Alternate means of communication, such as courier and land line, are used to a very great degree. Radio communication is kept to a minimum, usually restricted to brief codewords, signals, or

bursts. Antennas and transmitters will be remoted using land lines. Mobile control points must be carried in the same type of vehicle common to the combat formation, in order to make discrimination of the command vehicle more difficult.

In order to minimize the probability of a hit on a control point, the Soviets move them frequently. Mobile posts must be able to function fully while on the move, although as Ivanov notes, efficiency is always reduced when this is required, even if brief pauses are made in order to control. It is better to displace as rapidly as possible from one point to the next, moving at maximum speed, and then deploying the complete facilities of the control point. In addition to and contributing to a high degree of control point mobility is the reduction of the control element in size. It is important to station on them "only the responsible personnel who are directly participating in the control of subdivisions." [Ref. 98: p. 18]. High speed and maneuverability are essential in the control point. Soviet writings assert that the helicopter is the most effective vehicle on the modern battlefield, because it allows the commander both to see the battle and to follow it physically, never leaving the vehicle. Semenov [Ref. 113] admonished commanders never to leave their command and staff vehicles and transfer to lighter vehicles for convenience in observing the battle. That practice leads to separation

from communications and thus to loss of control -- "irreparable consequences in a combat situation."

Control points must be difficult to destroy. Thus, fixed control points are extensively hardened, buried at great depths in the case of the strategic command posts. Even in the field, command posts must be hardened by accompanying engineer troops. Mines, ravines, and other natural features are desireable locations for command posts [Ref [Ref. 10: p. 94]. Command vehicles must have the same degree of protection as the combat elements. Point air defense is always provided, as is an adequate defensive combat element to protect the control point against ground or airborne attack. "In modern combat it is impossible to insure continuity of troop control if the necessary concern is not shown for the defense of the personnel of the control units against the means of destruction." [Ref. 10: p. 92] It can be imagined that control vehicles will be provided entrenchments scooped out by the engineers accompanying the command post. Posts should never be located so close to one another that a single medium sized nuclear detonation would destroy them both.

b. Continuity of Communications

While recognizing that communications will be exceedingly difficult to maintain during modern combat, Soviet military theoreticians insist that they are essential. Numerous articles assert that, despite all

interference, jamming, EMP, and electronic warfare, it will still be possible to communicate. "Communication is the material foundation of troop control in combat. To lose communication means to lose everything..." [Ref. 114: p. 23]. In describing a field exercise, a lapse in communications is noted [Ref. 115: p. 20]: "Loss of control and communications with attached and supporting subunits even for a short time weakened the force of the attack and had an effect on precision of execution."

Maintaining constant communication with superiors is a responsibility of the subordinate commander. On Soviet ships, the commander is the only one authorized to use the communications means, and he is prohibited from delegating that authority. He must also specify the exact means and method of transmitting a message. "The commanders must not fail to maintain uninterrupted and stable communications with higher command levels." [Ref. 116]

Semenov also indicated that commanders must be much more qualified in technical matters than one would expect [Ref. 113]:

All officers passed examinations on knowledge of the radios and the ability to work on them. On the exercise, each commander had a diagram of radio nets or communications lines, call signs, and special digital data on a prearranged coordinate grid. All this helped the officers to initiate communications quickly, to control subordinates reliably, and to assign them new missions in time without violating the rules of deception and discipline in radio traffic in so doing.

All of the modern techniques for ECCM, such as brevity in transmission, frequency hopping, and internetting are practiced. [Ref. 117] Superior commanders are advised to have their radio operators monitor the traffic on subordinates' radio networks, which both decreases the number of transmissions required in reporting upward and decreases the time delay attendant on reporting through channels serially.

When more sophisticated techniques fail or are not advisable for reasons of secrecy of intentions, non-technical means of communication should be used. These include signal lamps, semaphore, flares, flags, rockets, and most especially, couriers [Ref. 12: p. 86].

In case the worst happens, and a unit is cut off from all control by a higher echelon, it will continue to function in the performance of the mission. It may function based upon algorithms previously disseminated. This is not the desired mode of operation, but one which will allow maximum predictability of subordinates and ensure that they are not rendered totally ineffective by loss of communications.

c. Recoverability of Control

Soviet practice is to insure that the loss of any one control point, or of any one means of communication, should not interrupt the continuity of control. It is

inevitable that control points will be destroyed or rendered ineffective during the course of battle. This will not disrupt command and control if adequate planning and preparation has been made.

A whole series of fall-back control points is arranged prior to operations, so that should the main control point be destroyed or lose its communications means, its functions can be immediately assumed by another. In lower level units, like the battalion, one of the subordinate companies will be designated in advance as the successor control point to the battalion. In that case, it will be provided with all of the communications means used by the battalion point and will be required to monitor all of the activities of the higher element. Assumption of a lower control point's functions is also possible by the higher element, although this is not currently preferred. Special contingency staff sections are designated within the higher headquarters element to restore control lost at a lower level if necessary. All headquarters above battalion have at least an alternate, and higher levels also have control points specialized for particular combat and support arms. These will also be designated as successor control points.

Regardless of which element takes over, Soviet doctrine is to replace a control point immediately after a

nuclear strike, if communications have been lost with it.

[Ref. 10: p. 98].

The possibility of realizing this type of control is ensured by the fact that the superior unit must have communications with the control unit a step lower than his direct subordinate, and therefore rearrangement of the communications system is not required.

The picture that develops is one of an interlocking command network, each element of which must be prepared to assume the duties of the next higher or lower element. The skip echelon structure ensures continuity and redundancy. Loss of one control point has little effect.

5. Commander's Representatives

One of the most striking characteristics of the Soviet practice of command and control is the use of staff officers to oversee the activity of subordinate headquarters. Logvin calls staff officers [Ref. 114: p. 23], "the basic means with which the commander controls his subunits on the field of battle." Just as the representatives of the High Command were sent out to the fronts and operational groups during World War II, so are staff officers used by the Soviet commander of today.

Staff officers have duties which extend well beyond the normal ones of collecting information, organizing it for the commander's decision, and coordinating the details of operational matters. Perhaps because the commander has more trust in the members of his personal staff, and because they

are more likely to be aware of the complete operational situation of the superior headquarters, staff members are used both to transmit the commander's decisions to the subordinates and also, as Sokolov says [Ref. 116], "firmly and persistently oversee its execution."

Use of staff officers as personal representatives allows the commander's plan to be communicated in a detailed and comprehensive way. The staffer can fully study the commander's own map and question him to eliminate any ambiguity prior to departing for the mission. By remaining in the subordinate's command post after delivering the plan, the staffer is in a position to observe and monitor the operational performance of the unit. He also serves as a ready reference to eliminate any misinterpretation of the plan which might otherwise occur. Much more detail can be conveyed, and in a secure manner, by relaying the plan in this way. Grebenets notes [Ref. 117: p. 2] "The ideal way to assign combat missions is the personal contact of the commander and staff with subordinates."

The role of the staffer is not always limited to one of passive observation. Although the staff representative is invariably junior in rank to the subordinate commander, he exercises some authority over him. He is an "authoritative representative" of the superior, according to Ivanov [Ref. 10: p. 283], and is personally responsible for the "accurate execution of all the planned measures by the

subordinate commander or staff." Potential conflicts are not addressed in the literature, although this practice is seen to infringe upon the authority of 'one man command.'

The Soviet commander at division and above has an additional asset used to control his subordinate elements during movement and when dispersed over an area. This is the commandant's service of regulators, sometimes translated as controllers. According to Ivanov [Ref. 10: p. 255-260], this service was organized to facilitate "timely and secret" movements of forces about the battlefield. They act as messengers, couriers, and guides. They provide traffic regulating posts, equipped with their own radio network, which can be used by the commander during the march to direct and monitor the movements of his forces. They are considered essential in coordinating the momentarily massed forces envisioned by the Soviets as the key to the offensive. This service also allows the strictest radio discipline prior to an offensive, when no other means of communication may be available with units on the march.

V. CONCLUSIONS

Contemporary Soviet command and control doctrine is principally derived from the Soviet experience during World War II. The concerns which are addressed explicitly in the literature and implicitly in the design of their system reflect the lessons learned in that conflict. Together with the ideological factors, which have persisted with less change, the historical evolution of command and control patterns is the key to understanding present-day philosophy, doctrine, and practice.

Wartime experience has influenced modern command and control in two distinct ways. First, there were a number of experimental or ad hoc features adopted during the war which worked extremely well. These features, which have been retained in doctrine or in practice, are summarized briefly in Table 2.

Current Soviet doctrinal literature exhibits an acute sensitivity to the critical failings of Soviet command and control in World War II. The lessons of the past are strikingly reflected in contemporary practice. These features are contrasted in Table 3.

Soviet systems and procedures are generally dominated by strict centralization and close supervision. The advantages of centralization can be a more optimal allocation of

Feature	<ul style="list-style-type: none"> * Original purpose + New or added purpose
Skip-echelon communications	<ul style="list-style-type: none"> * Increase the survivability of the radial communications structure + Allow deeper monitoring of subordinate activity + Expedite flow of information
Preference for courier, then wire, then radio communications	<ul style="list-style-type: none"> * Compensate for lack of radios * Fear of enemy exploitation of radio communications + Enhance operational security + Decrease possibility of garble + Decrease vulnerability to counter-C3
Integration of civil and military communications	<ul style="list-style-type: none"> * Civil communications were the only resources available + Utilize every possible resource
Dual subordination	<ul style="list-style-type: none"> * Provide operational support to field commander while retaining centralized control over resources + Allow two channels upward for conflict resolution, insuring centralized management by elevating all conflicts
Strategic leadership entities	<ul style="list-style-type: none"> * Consolidated all national authority

Table 2

Successful World War II
Features Retained in Soviet System Today

Feature	* Original purpose + New or added purpose
Vertical compartmentation of weapons systems	<ul style="list-style-type: none"> * Facilitate Stavka control over allocation of specific classes of weapons systems * Reduce the diversity of tasks required of any given command * Optimize use of small number of technical experts * Allow field staffs to shrink + Allow tailoring of forces to fit any scenario + Allow special branches of services more authority over branch-unique developments
Centralized planning, elevated several echelons	<ul style="list-style-type: none"> * Compensate for inexperienced commanders in the field * Allow field staffs to concentrate on immediate operations * Reduce size of field staffs * Insure coordinated action by all forces
Military councils	<ul style="list-style-type: none"> * Collective leadership as the ideology required * Consolidate all local military and civil authority * Prevent military conspiracy + Reduce requirements for real-time communications

Table 2 (Continued)

Successful World War II C3
Features Retained in Soviet System Today

Feature	<ul style="list-style-type: none"> * Original purpose + New or added purpose
Personal contact by representatives of higher echelon	<ul style="list-style-type: none"> * Extension of central authority without decentralizing * Provide instant, unbiased feedback to the center * Insure exact compliance with orders * Optimize use of talented officers
Confused delineation of authority and responsibility	<ul style="list-style-type: none"> * Promote conflict, forcing issues upward for resolution * Hinders growth of subordinate's personal authority + Reinforces centralized control
Multiple, independent channels for monitoring activity at each level	<ul style="list-style-type: none"> * Prevents collusion * Forces accurate reporting * Resolves ambiguities at the highest levels

Table 2 (Concluded)

Successful World War II C3
Features Retained in Soviet System Today

Feature	Current Posture
Soviet response to the invasion was crippled German counter-C3 measures	Strong Soviet counter-C3 doctrine, and a preference for survivability over capacity in their own C3
No prepared command posts	Proliferation of command facilities of hardened, mobile, and airborne types
Little organic communication equipment at operational levels	Multiplicity of communications equipment, diverse means, and organic reserve equipment
No pre-determined strategic command relationships	Established command entities, frequently exercised
No standardized internal operating procedures for field staffs	Well-defined standardized procedures and norms for all staff activity
Turbulence in command assignments	Stability in command assignments
Insufficient mobility for field commanders	Excellent armored command vehicles
Commissars had operational role, co-signed orders	One-man command at most levels

Table 3
 Critical Failings of Soviet Wartime C3
 to Which Sensitivity Persists

defense resources and more comprehensive, coordinated action by diverse force elements. Centralization also serves the regime's purpose by reducing local autonomy and reserving to the top leadership exclusive rights to substantive decision-making.

Centralization to a large degree represents a lack of trust in the loyalty or lack of faith in the ability of subordinates. A consequence is the existence of multiple monitoring channels, independently reporting to their own higher echelons.

The tendency to blur organizational and individual responsibility encourages the reliance on collective decision-making, which is also an ideological precept. Differences of opinion are provoked by the very structure of the organization, forcing issues upward for resolution. During periods of national stress, the distinction between authoritative bodies can be expected to disintegrate; this disintegration fosters more effective responsive action within the Soviet system than would be possible were roles more clearly delineated. Individual initiative, suspect in the Soviet Union, is functionally replaced by collective action.

The organizational structure and force divisions found today in the Soviet Armed Forces are the end product of several years of experimentation under true wartime conditions. The vertical compartmentation of special

weapons systems, the control of a disproportionately large percentage of the force directly by the strategic leaders, the organization of national command authorities and the way they relate, and the architecture of the communications system were all developed during World War II.

Tenets of contemporary Soviet doctrine reflect the harsh lessons of the war. The importance of achieving surprise, the vulnerability of radio- electronic communications to exploitation, and the devastating effects of a coordinated counter-command and control strategy are all dominant themes in current Soviet military writings. The proliferation of command posts, including hardened, mobile, and airborne facilities, contrast sharply with the Kirovskaya Subway Station of 1941-1944. The multiplicity of communications media provided at all echelons today is in contrast to the total lack of military communications means at some echelons at the start of the war. Even the turbulence in the pre- and early war command assignments has been rectified; today, the key military positions are held for years by the same officer.

Still trying to resolve the difficulties with trust, much effort is being devoted to automation of command and control functions. This is not only a means of increasing the efficiency of the system, but also raises its performance and reliability by orders of magnitude over the manual system. Machines are more securely programmed, and

eminently more predictable. They respond to the exact dictates of the algorithm or norm which has been validated and standardized. They have no ulterior or seditious motives and their performance is not degraded by fear. Automation is a perfect solution to the peculiar uncertainties of Soviet command and control.

The Soviets claim that the armed forces are a social entity, an extension of the state. To serve the state, the forces are controlled in uniquely Soviet ways. What they demand of the command and control system, and how they are likely to use it in the future, are best understood in the historical context of their World War II experience.

LIST OF REFERENCES

An Explanatory Note

Citations of translated material give the original publication information first, followed by the English source. In many cases the Russian version has only been translated in excerpts. Knowledge of the original Soviet publication date is also necessary in evaluating the material, as is the rank of military authors. The following abbreviations have been used:

JPRS	- Joint Publications Research Service
KVS	- Kommunist Vooruzhennykh Sil (Communist of the Armed Forces)
KZ	- Krasnaya zvezda (Red Star)
MA	- Military Affairs Translations, serially published by the JPRS
SMTS	- Soviet Military Thought Series, a series of translations published under the auspices of the U.S. Air Force by the U.S. Government Printing Office
VIZ	- Voenno-istoricheskiy Zhurnal (Journal of Military History)
Voyenizdat	- Order of Labor Red Banner Voyennoye Izdatel'stvo Ministerstva Obrony SSSR (USSR Ministry of Defense Military Publishers)

1. Adelphi Paper No. 76, Technology, Management, and the Soviet Establishment, by David Holloway, Institute for Strategic Studies, London, April 1971.
2. Marxism-Leninism on War and Army, Progress Publishers, 1972. Reprinted as No. 2, SMTS.
3. Penkovskiy, Oleg, The Penkovskiy Papers, Doubleday & Company, 1965.

4. Scott, William F., Soviet Sources of Military Doctrine and Strategy, National Strategy Information Center, Inc., Crane, Russak, and Company, Inc. 1975.
5. Scott, William F., "Soviet military Doctrine and Strategy: Realities and Misunderstandings," Strategic Review, v. 3, n. 2, Summer 1975.
6. Zhilin, P.A., Problems of History, Vcyenizdat, 1975. JPRS L/5674, 25 February 1976, MA GUO 8/76, p. 15 - 57.
7. Erickson, John, "Soviet Theater warfare Capability," in The Future of Soviet Military Power, Lawrence L. Whetten, ed. Crane, Russak, and Company, 1976, p. 117-156.
8. Pavlovskiy, Army General I.G., "The Soviet Land Forces," Soviet Military Review, n. 9, September 1976, p. 2 - 7. JPRS L/6563, 29 October 1976, MA GUO 51/76, p. 38 - 42.
9. Shtemenko, General of the Army S.M., The Soviet General Staff at War: 1941 - 1945, Progress Publishers, 1970. (Note: The pagination of the second printing, which is used here, differs from that of the first printing.)
10. Ivanov, D.A., Savel'yev, V.P., and Shemanskiy, P.V., Fundamentals of Troop Control in Combat, Vcyenizdat, 1977. JPRS L/8380, 6 April 1979.
11. United States Strategic Institute Report 73-3, The Soviet Military, Soviet Policy, and Soviet Politics, by John Erickson, 1973.
12. Gornyy, Colonel-General of Justice A., "The Legal Basis for Life in the Armed Forces," KVS n. 7, April 1978, p. 9 - 16. JPRS 71395, 3 July 1978, MA 1360, p. 66 - 75.
13. Scott, William F. and Scott, Harriet F., The Armed Forces of the USSR, Westview Press, 1980.
14. Zemskov, Major General V., "Some Questions on the Conduct of War," KVS, n. 22, November 1972, p. 15 - 21. JPRS 58110, 31 January 1973, MA 884.
15. Fedchenko, Colonel F., "For Political Study-Group Leaders: V.I. Lenin and the CPSU -- Creator of the Soviet Armed Forces," KVS, n. 14, July 1978, p. 69 -

77. JPRS 72024, 11 October 1978, MA 1385, p. 43 - 55.

16. Rand Corporation Report R-1742-PR, Relations Between the Soviet Union and its Eastern European Allies: A Survey, by J.F. Brown, November 1975.

17. Sokolovskiy, V.D., Military Strategy, Voyenizdat, 1961. Trans. and ed. by Rand Corporation under title Soviet Military Strategy, Rand, 1963.

18. Woff, R.A., "The Ground Forces," in Soviet Armed Forces Review Annual, ed. by David R. Jones, v. 4, 1980, p. 76 - 107.

19. Vydrov, Colonel I., "Strategy and Operational Art: On the Leadership of Military Operations of Strategic Groupings in World War II," VIZ, n. 4, April 1979, p. 18 - 23. JPRS 073677, 13 June 1979, MA 1446, p. 19 - 26.

20. Zav'yalov, Lieutenant I.G., "The New Weapon and Military Art," KZ, 30 October 1970, p. 2 - 3. Trans. in Selected Soviet Military Writings 1970 - 1975, ed. by W.F. Scott, No. 11, SMTS, p. 206 - 213.

21. Polmar, Norman, ed., Soviet Naval Developments, Nautical and Aviation Publishing Company of America, 1979.

22. Andersen, Yu.A., Drezhzhin, A.I., and Lozik, P.M., Air Defense of Ground Troops, Voyenizdat, 1979. JPRS L/9337, 8 October 1980.

23. Gordiyenko, Colonel G.K., and Khroshcho, Colonel V.V., Initiative and Self-Reliance in Battle, Voyenizdat, 1970. JPRS 53874, 23 August 1971, MA 732.

24. Sukhorukov, Colonel-General D., "Initiative, Self Reliance," KZ, 28 March 1978, p. 2. JPRS 70975, 19 April 1978, MA 1347, p. 50 - 54.

25. Weiner, Friedrich, and Lewis, William J., The Warsaw Pact Armies: Organization - Concert of Operations - Weapons and Equipment, Carl Ueberreuter Verlag, 1977.

26. Shcherbakov, Colonel A., "A Commander's Development: Execution and Initiative," KZ, 6 September 1979, p. 2. JPRS 75129, 14 February 1980, MA 1496, p. 41 - 44.

27. Rand Corporation Report RM-6171-PR, The Sino-Soviet Border Dispute: Background, Development, and the March 1969 Clashes, by Thomas W. Robinson, August 1970.

28. Skirdo, Colonel M.P., "Leadership in Modern War," from The People, the Army, and the Commander, Voyenizdat, 1970, p. 96 - 150. Trans. in Selected Soviet Military Writings 1970 - 1975, ed. by W.F. Scott, No. 11, SMTS, p. 148 - 164.

29. Kozlov, Lieutenant-General R.A., and Slavin, M.M., Problems of State and Law, Moscow, 1975, p. 65 - 81. JPRS L/7262, 13 July 1977, MA GUO 31/77, p. 14 - 29.

30. Mashkov, Colonel Ye., "When the Decision Has Been Adopted: Workstyle in the Party Committee," KZ, 22 May 1977, p. 2. JPRS 69581, 12 August 1977, MA 1291, p. 37 - 42.

31. Belyayev, Captain 1st Rank A., "Control and Verification of Execution as a Method of Scientific Management," KVS, n. 16, August 1973, p. 18 - 25. JPRS 62249, 10 October 1973, MA 968, p. 20 - 29.

32. Malinovskiy, Major-General of Aviation N., "The Commander and the Party Organization," KVS, n. 19, October 1974, p. 47 - 54. JPRS 63558, 29 November 1974, MA 1297, p. 25 - 31.

33. Timofeyechev, M.N., "Strengthening One-Man Command -- A Most Important Condition of High Combat Readiness," KVS, n. 5, March 1976, p. 56 - 64. JPRS L/5980, 13 May 1976, MA GUO 21/76, p. 14 - 23.

34. Timofeyechev, M.N., One-Man Command in the Armed Forces, Voyenizdat, 1978. JPRS L/8106, 16 November 1978, MA FOUO 17/78, p. 49 - 65.

35. Lomov, Lieutenant-General N.A., ed., Scientific Technical Progress and the Revolution in Military Affairs, Voyenizdat, 1972. Trans. as No. 3, SMTS.

36. Izgarshev, Colonel V., and Pedyur, Colonel V., "On a Level With the Standards of the Party," KZ, 8 July 1976. Trans. in Strategic Review, v. 5, n. 1, p. 135 - 143, Winter 1977.

37. Armed Forces Management, "How Soviet Command and Control Works," July 1968, p. 119 - 120.

38. Odor, W.E., "The Soviet Military: Party Ties," Problems of Communism, September - October 1973, p. 12 - 24.

39. Grigorenko, Army General Piotr G., "There Will Be War Before the End of 1980," interview by L'Europe (Milan), 13 May 1980, p. 120 - 132. JPRS I/9222, 25 July 1980, MA FOUO 14/82, p. 1 - 8.

40. Popel, N.N., Savel'yev, V.P., and Shemanskiy, P.V., Trccp Control During the Great Patriotic War, Voyenizdat, 1974. JPRS 64920, 4 June 1975.

41. Erickson, John, Road to Stalingrad: Stalin's War with Germany, Volume I, Harper and Row, 1975.

42. Werth, Alexander, Russia at War 1941 - 1945, Barrie and Rockliff, 1964.

43. Eremenko, Marshal A.I., V nachale voiny, Moscow, 1965, p. 45 - 54. Trans. in Bialer (Ref: 47), p. 146 - 151.

44. Biriuzov, Marshal S.S., Sovetskii soldat na balkanakh, Moscow, 1963, p. 137 - 143. Trans. in Bialer (Ref: 47), p. 84 - 86.

45. Starinov, Colonel I.T., Miny zhdut svoego chasa, Moscow, 1964, p. 149 - 166, 210 - 212. Trans. in Bialer (Ref: 47), p. 65 - 79, 236 - 238.

46. Kuznetsov, Admiral N.G., "Vcennc-morskci flet nakanune Velikoi Otechestvennoi voiny," VIZ, n. 9, September 1966, p. 65 - 67. Trans. in Bialer (Ref: 47), p. 347 - 350.

47. Bialer, Sweryn, ed., Stalin and His Generals: Soviet Military Memoirs of World War II, Pegasus, 1969.

48. Shtemenko, Colonel-General S.M., "Vydaiushchiisia Sovetskii voenachal'nik," VIZ, n. 8, August 1966, p. 42 - 46. Trans. in Bialer (Ref: 47), p. 355 - 360.

49. Kelley, Walter, "Pogo," New York Times Syndicate.

50. Berezhkov, V.M., S diplomaticeskoi missiei v Berlin 1940 - 1941, Moscow, 1966. Trans. in Bialer (Ref: 47), p. 212 - 218.

51. Verchnov, Chief Marshall of Artillery N.N., Na sluzhbe voennoi, Moscow, 1963. Trans. in Bialer (Ref: 47), p. 131 - 133, 227 - 212, 302 - 304.

52. Telegin, Lieutenant-General K.F., "Moskva - frontovci gorad", Voprossy Istorii KPSS, n. 9 1966, p. 101 - 104. Trans. in Bialer (Ref: 47), p. 272 - 276.

53. Kazakov, General of the Army R.I., Nad kartoi bylykh srazhenii, Moscow, 1965. Trans. in Bialer (Ref. 47), p. 187 - 189, 421 - 422.

54. Kozlov, Lieutenant-General M.A., and Slavin, N.M., "Military Councils in the Soviet Armed Forces," in Problems of State and Law, Moscow, 1975, p. 65 - 81. JPRS L/7262, 13 July 1977, MA GUO 31/77, p. 14 - 30.

55. Romanov, P.I., and Pavlov, N.I., "System of Control of USSR Armed Forces in the Great Patriotic War," in Problems of State and Law, Moscow, 1975, p. 53 - 64. JPRS L/7262, 13 July 1977, MA GUO 31/77, p. 1 - 13.

56. Atkinson, Littleton B., "Conflict in Command in the Red Army," Military Review, May 1952, p. 18 - 31.

57. U.S. Army, Department of the Army Pamphlet 20-230, Russian Combat Methods in World War II: A Historical Study, U.S. Government Printing Office, November 1950.

58. Bagramian, Marshal I.Kh., "Zapiski nachel'nika operativnozo," VIZ, n. 3, March 1967, p. 52 - 68. Trans. in Bialer (Ref: 47), p. 244 - 254.

59. Danilov, Colonel V., "The General Staff of the Workers and Peasants' Red Army (RKKA) in the Pre-War Years (1936- June 1941)," VIZ, n. 3 March 1980, p. 68 - 73. JPRS 75992, 7 July 1980, MA 1522, p. 95 - 103.

60. Kuznetsov, Admiral N.G., "Pered voinoi," Oktiabr', n. 9 1965, p. 174 - 182, 188 - 189. Trans. in Bialer (Ref: 47), p. 90 - 98, 135 - 136.

61. Tiulenev, General of the Army I.V., Cherez tri voiny, Moscow, 1960. Trans. in Bialer (Ref. 47), p. 137 - 142.

62. Peresypkin, Marshal of Signal Troops, "Communications Centers in Front and Army Operations," VIZ, n. 1, January 1978, p. 28 - 38. JPRS 79715, 2 March 1978, MA 1334, p. 1 - 15.

63. Zhukov, Marshal Georgi K., Marshal Zhukov's Greatest Battles, ed. by H.E. Salisbury, Harper and Row, 1969. (Note: This volume is a collection of articles appearing originally in VIZ, between June 1965 and September 1967).

64. Krasnaya zvezda, "Closing Out the Column," KZ, 5 May 1975, p. 4. (Concluding article of two-year series on the GKO). JPRS 65089, 26 June 1975, MA 1156, p. 1-3.

65. Aspaturian, Vernon, Evolution of Soviet National Decision-Making, paper presented at the Conference on Soviet Decision-Making for National Security, Naval Postgraduate School, Monterey, California, 14 - 16 August 1980.

66. Morozov, V.P., "Some Questions on the Organization of Strategic Leadership in the Great Patriotic War," Istoriya SSSR, n. 3, May - June 1975, p. 12 - 29. JPRS 65273, 21 June 1975, MA 1164, p. 31 - 57.

67. Golubovich, Colonel V., "On the Corps of Officers -- Representatives of the General Staff," VIZ, n. 12, December 1975, p. 67 - 71. JPRS 66636, 21 January 1976, MA 1216, p. 44 - 52.

68. Rokossovskiy, Marshal K.K., "Na vokolamskom napravlenii," VIZ, n. 11, November 1968, p. 46 - 54. Trans. in Bialer (Ref. 47), p. 296 - 298.

69. Pokrovskiy, Colonel-General, "Memcirs: On the Southwest Sector (July - September 1941)," VIZ, n. 4, April 1978, p. 64 - 72. JPRS 71395, 3 July 1978, MA 1360, p. 39 - 51.

70. Batov, General of the Army P.I., V pokhodakh i boiakh, Moscow, 1962. Trans. in Bialer (Ref. 47), p. 417 - 420.

71. Kulikov, General of the Army V., "Strategic Leadership of the Armed Forces," VIZ, n. 6, June 1975, p. 12 - 24. JPRS 65167, 8 July 1975, MA 1162, p. 40 - 55.

72. Dunnigan, James F., The Russian Front: Germany's War in the East, 1941 - 45, Arms and Armor Press, 1978.

73. Seaton, Albert, The Russo-German War 1941 - 1945, Praeger, 1970.

74. Sandalov, Colonel-General L.M., Trudnye rubezhi, Moscow, 1965, p. 3 - 10. Trans. in Bialer (Ref: 47), p. 423 - 428.

75. Altukhov, Lieutenant General P., "Some Questions on Controlling Troops in an Army Offensive," VIZ, n. 9, September 1976, p. 11 - 19. JPRS L/6602, 10 November 1976, MA GUO 55/76, p. 26 - 28.

76. Stavka Order # 30130, 18 May 1943, signed by I.V. Stalin and A.I. Antonov. JPRS L/6602, 10 November 1976, MA GUC 55/76, p. 24 - 25.

77. Golikov, Marshal F.I., "Reservnaia armiiia gotvitsia k zashchite stolitsy," VIZ, n. 5, May 1966, p. 65 - 76. Trans. in Bialer (Ref. 47), p. 311 - 318.

78. Bokov, Lieutenant-General F., "A Conference at Headquarters on the Reorganization of the Tank Army," VIZ, n. 3, March 1979, p. 38 - 47. JPRS 73533, 24 May 1979, MA 1441, p. 37 - 44.

79. Khrulev, General of the Army A.V., "Stanovlenie stratego- icheeskogo tyla v Velikoi Otechestvennoi," VIZ, n. 6, June 1961, p. 64 - 80. Trans. in Bialer (Ref. 47), p. 368 - 377.

80. Silant'yev, Marshal of Aviation A., "Directing Aviation in Troop Offensive Operations," VIZ, n. 4, April 1976, p. 29-38. JPRS L/6066, 9 June 1976, MA GUO 25/76, p. 22 - 33.

81. Pervov, Major A., "Maneuvers of Aviation Reserves by Headquarters, Supreme High Command," VIZ, n. 2, February 1977, p. 94 - 100. JPRS L/7133, 18 May 1977, MA GUO 23/77, p. 16 - 26.

82. Kozhevnikov, Major General of Aviation M., "The Interaction of the Air Force and the Infantry During the Third Period of the War," VIZ, n. 3, March 1979, p. 16 - 21. JPRS 73533, 24 May 1979, MA 1441, p. 21 - 28.

83. Ammon, Captain 1st Rank, "Direction of Headquarters, Supreme High Command, on Improving Operational Direction of Fleets and Flotillas," VIZ, n. 11, November 1976, p. 66 - 69. JPRS L/6755, 3 January 1977, MA GUO 1/77, p. 73 - 80.

84. Peresypkin, Marshal of Signal Troops I.T., Communications in the Great Patriotic War, Izdatel'stvo nauka, 1973. JPRS 64919, 4 June 1975.

85. Peresypkin, Marshal of Signal Troops I.T., "Organization and Execution of Communication in Defensive Operations of Combined Arms Armies," VIZ, n. 7, July 1977, p. 56 - 62. JPRS 69736, 2 September 1977, MA 1298, p. 31 - 38.

86. Peresypkin, Marshal of Signal Troops I.T., "Communications of the General Staff," VIZ, n. 4, April 1971, p. 19 - 25. JPRS 53121, 13 May 1971, MA 701, p. 59 - 68.

87. Konev, Marshal I.S., Sorok piatyi, Moscow, 1966, p. 187 - 204. Trans. in Fialer (Ref. 47), p. 516 - 532.

88. Standard Handbook for Electrical Engineering, 7th Ed., McGraw Hill Book Company, 1941.

89. Maramzin, Colonel V., "Operating Methods of the Army Commander in the Course of the Offensive Operation," VIZ, n. 4, April 1976, p. 22 - 28. JPRS L/6066, 9 June 1976, MA GUO 25/76, p. 13 - 21.

90. Portugal'skiy, R., "Command Procedures in the Great Patriotic War," VIZ, n. 12, December 1975 JPRS 66636, 21 January 1976, MA 1216, p. 34 - 43.

91. Paliy, Major-General of Engineers A., "Radio-Electronic Activities During the War," VIZ, n. 5, May 1977, p. 10 - 19. JPRS 69454, 20 July 1977, MA 1285, p. 12 - 17.

92. Alferov, Colonel S., "Regrouping of the Third Guards Tank Army in the Battle for the Dnepr (October 1943)," VIZ, n. 3, March 1980, p. 16 - 24. JPRS 75992, 7 July 1980, MA 1522, p. 19 - 33.

93. Tsygankov, Colonel P., "Development of the Tactics for an Offensive Night Battle in the Postwar Years," VIZ, n. 10, October 1978. JPRS 72489, 21 December 1978, MA 1404, p. 71 - 81.

94. Golovnin, Lieutenant General M., "On Some Problems of Control in the Offensive Engagement (1945 - 1953)," VIZ, n. 1, January 1978, p. 48 - 55. JPRS 71047, 2 May 1978, MA 1349, p. 7 - 16.

95. Garder, Michel, A History of the Soviet Army, Praeger, 1966.

96. Record, Jeffrey, Sizing Up the Soviet Army, Brookings Institute, 1975.

97. Douglas, Joseph D., Jr., The Soviet Theater Nuclear Offensive, Volume 1 in the USAF Studies in Communist Affairs, U.S. Government Printing Office.

98. Reznichenko, Lieutenant-General V., "Decision and Control," KZ, 11 December 1974, p. 2. JPRS 63874, 14 January 1975, MA 1127, p. 13 - 18.

99. Gorbatenko, Colonel D.D., The Time Factor in Modern War, Voyenizaat, 1972. Trans. in Strategic Review, v. 2, n. 1, p. 92 - 94, Winter 1974.

100. Jacobsen, C.G., Soviet Strategic Initiatives: Challenge and Response, Praeger, 1979.

101. Bondarenko, Colonel Y.M., "Scientific-Technical Progress and Troop Control," KVS, n. 12, May 1973. Trans. in Selected Soviet Military Writings 1970 - 1975, ed. by W.F. Scott, No. 11, SMTS.

102. Reznichenko, Lieutenant-General V., "The Art of Control," KZ, 13 December 1977, p. 2. JPRS 70625, 10 February 1978, MA 1329, p. 51 - 55.

103. Evgn'ev, Lieutenant Colonel B., "According to a Network Diagram," KZ, 21 January 1971, p. 1. Trans. in Soviet Cybernetics Review, July 1971, p. 49 - 50.

104. Kirov, Colonel A., "The Time Factor and the Soldier's Mentality," KVS, n. 2, January 1976, p. 52 - 58. JPRS L/5764, 22 March 1977, MA GUO 12/76

105. Babich, Colonel B., Dubovitskiy, Colonel A., Lavrent'yev, Colonel Ye., "Modelling in the Military," Aviatsiya I Kosmonautika, serialized, starting with n. 3, March 1977, running through n. 8, August 1977. JPRS 70154, 14 November 1977, MA 1315, p. 1 - 34.

106. Anashechey, Engineer-Colonel A., "An Engineering Decision," KZ, 3 April 1980, p. 2. JPRS 76467, 22 September 1980, MA 1535, p. 7 - 10.

107. Volkov, Engineer-Lieutenant Colonel A., "Mathematics and Troop Control," KZ, 9 August 1973, p. 2 - 3. JPRS 59945, 31 August 1973, MA 953, p. 33 - 38.

128. Bondarenko, Colonel V.M., ed., Automation of Troop Control, Voyenizdat, 1977. JPRS L/8199, 4 January 1979.

129. Frelev, V.S., Computer Technology in Military Affairs, DOSAAF, 1972. Trans. in Soviet Cybernetics Review, May 1973, p. 47-48.

130. Voronin, Lieutenant-General A., "By the Complex Variant," KZ, 8 August 1978, p. 2. JPRS 72413, 12 December 1978, MA 1400, p. 5 - 8.

131. Kalashnikov, Engineer-Colonel V., "Who Has Control Over the Automatic System -- Has Control in Battle," KZ, 17 June 1980. JPRS 76624, 15 October 1980, MA 1539, p. 49 - 51.

132. Druzhinin, D.D., and Kontorov, D.S., Concept, Algorithm, and Decision: Decision-Making and Automation, Voyenizdat, 1972. Trans. as No. 6, SMTS.

133. Semenov, Major-General of Signal Troops S., "Reliability in Communications," KZ, 5 September 1978, p. 2. (Note: This article opened a new column in KZ headed 'Control in Battle') JPRS 72427, 13 December 1978, MA 1402, p. 9 - 13.

134. Logvin, Lieutenant Colonel A., "The Reliability of Control -- the Commander and Modern Battle," KZ, 18 September 1976, p. 2. JPRS 68372, 16 December 1976, MA 1257, p. 22 - 24.

135. Krasnaya zvezda, "Emphasizing Importance of Field Exercises," KZ, 14 September 1976, p. 1. JPRS 68372, 16 December 1976, MA 1257, p. 18 - 21.

136. Sigal, Captain 1st Rank D., "The Commander and Communications," KZ, 19 May 1971, p. 2. JPRS 53424, 22 June 1971, MA 713

137. Grebenets, Major-General G., "Stability of Communications," KZ, 15 February 1977, p. 2. JPRS 69092, 13 May 1977, MA 1275, p. 1 - 4.

138. Sokolov, Major-General A., "The Staff in the Dynamics of Combat," KZ, 3 October 1973, p. 2. JPRS 60468, 6 November 1973, MA 978, p. 9 - 14.

INITIAL DISTRIBUTION LIST

	No. Copies
1. Defense Technical Information Center Cameron Station Alexandria, Virginia 22314	2
2. Library, Code 0142 Naval Postgraduate School Monterey, California 93940	2
3. Professor John M. Wozencraft, Code 74 Chairman, C3 Academic Group Naval Postgraduate School Monterey, California 93940	3
4. Professor William Reese, Code 61Rc Department of Physics and Chemistry Naval Postgraduate School Monterey, California 93940	10
5. Professor Paul H. Moose, Code 62Me Department of Electrical Engineering Naval Postgraduate School Monterey, California 93940	1
6. Captain Wayne P. Hughes, Code 55Hi Department of Operations Research Naval Postgraduate School Monterey, California 93940	1
7. Lt Col Jeffrey Johnson, USAF, Code 39 C3 Curricular Officer Naval Postgraduate School Monterey, California 93940	1
8. Captain Jeffrey A. Kern 165 Londonderry Drive San Mateo, California 94402	2
9. HQ, SAC/INXY Attn: CPT Jay Offutt AFB, Nebraska 68113	1
10. Director, NSA/CSS Attn: A213, Miller Ft Meade, Maryland 20755	1

11. Commander TRADCC TC4S Directorate ATTN: ATCD-CB Ft. Monroe, Virginia 23651	2
12. Office of the Secretary of Defense Director for Net Assessment Washington, D.C. 22301	1
13. Director Defense Intelligence Agency ATTN: DB-1B6 Washington, D.C. 20301	1
14. Commandant US Army Intelligence Center and School ATTN: Library Ft Huachuca, Arizona 85613	1

Th Thesis 192331
K3873 Kern
K1 c.1 Soviet command and
C control in an historical context.

192351
Thesis
K3873 Kern
c.1 Soviet command and
control in an histor-
ical context.

thesK3873
Soviet command and control in a historic



3 2768 001 03216 2

DUDLEY KNOX LIBRARY